SONY

## MULTI CASSETTE SYSTEM

# FLEXICART

**SUBJECT**

Addition and Replacement of Documents

**TABLE OF CONTENTS** Pages 1 to 4

**SECTION 2 THEORY OF OPERATION**

**APPLICABLE MANUALS/SERIAL NUMBERS**

BFC-1 (UC, EK) MAINTENANCE MANUAL
1st Edition
1st Edition (Revised-1 to Revised-2)

Above manuals are packed with the following machines.

| | |
|---|---|
| BFC-1 (UC): | #10001 and higher |
| BFC-1 (EK): | #20001 and higher |

## MAINTENANCE MANUAL

BFC-1 (UC, EK)
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## APPENDIX

A. BKFC-200 : Barcode Reader Unit

# SECTION 2
# THEORY OF OPERATION

## 2-1. GENERAL DESCRIPTION

### 2-1-1. Outline

This cart machine is a cassette automatic changer system used for editing in a broadcasting station and production house.
The format of the VTR can be used in any of BETACAM, S-VHS, and D-2. There are some types that can install one to six VTRs.
The cassette tape of each size based on a VTR format can be contained. For the cassette capacity per bin[1] in a D2 cassette, two S cassettes or one of M and L cassettes can be put in one bin.
The control system conforms to the RS-232C and RS-422A serial interfaces and can be externally controlled from an IBM PC/AT™ or its compatible personal computer[2].
When the control system is controlled from the RS-232C interface, the following are supplied from Sony as the optional application software that can be used by the IBM PC/AT™ or its compatible personal computer.

① BZC-100 (Remote control)

- The BZC-100 can select and move the cassette, operate the VTR, and switch the VIDEO/AUDIO switcher by operating directly from the external controller.
- The state of the cart machine that is in operation can be confirmed on the display of the external controller.

② BZC-110 (Playback)

The BZC-110 inputs a PLAY list[3] from the external controller and can transmit it automatically.

③ BZC-120 (Recording)

The BZC-120 inputs a REC list[4] from the external controller and can record it automatically.

### 2-1-2. Features

The major features of this cart machine are described below.

(1) Electric system

① An RS-232C port as well as an RS-422A port is also installed as an interface port. Therefore, an IBM PC/AT™ or its compatible personal computer can be used for the external control. (For the interface protocol, refer to the Flexicart Protocol and Command Specifications.)

② Since commands can be issued using a time trigger signal or parallel input signal, the electric system can be controlled in realtime without connecting a special board to the external controller.

③ The combination of the cart machine and an external controller (IBM PC/AT™ or its compatible personal computer) enables the great versatility of a basic system to a high-level system.

(2) Mechanical system

① The time[5] required for a cassette change is approximately 20 seconds.

② This cart machine is a 19-inch rack type. It installs VTRs at the lower position and bin units at the upper position.

③ When the door open key is pressed, an elevator detects the information and moves to the top position. As a result, the elevator is not damaged by an obstacle when inserting or removing a cassette into or from the bin.

④ Each bin unit is equipped with bin cassette sensors and senses the size and IN/OUT operation of a cassette.

⑤ The number of cassettes and bin shelves can be freely selected by the bin unit (optional).

---

[1] Bin: Each shelf into which a cassette is inserted.

[2] IBM PC/AT™ or its compatible personal computer: Personal computer with MS-WINDOWS™ (version 3.1 or higher) and with CPU of INTEL 80386 or higher.

[3] PLAY list: List information in which the playback time and location of a cassette tape to be played back are recorded.

[4] REC list: List information in which the recording time and location of a cassette tape to be recorded are recorded.

[5] Time required for a cassette change: Time required from when the next cassette is removed from the bin until it is inserted into the VTR after a cassette was removed from a VTR and transported to a bin.

The actual bin unit is constituted in height of 4U[6]. According to the VTR format, the number of bins per bin unit is shown in Table 2-1-1.

| Cassette Format | Number of bins (shelves) |
|---|---|
| D-2 | 4 shelves/bin unit |
| BETACAM | 5 shelves/bin unit |
| S-VHS | 5 shelves/bin unit |

Table. 2-1-1 Cassette Format and Bin unit Capacity (section 2-1-2. (2))

⑥ S, M, and L cassettes can be inserted into each bin unit if they have an applicable format. (Refer to Table 2-1-2.)

| Format | Cassette Size | Cassettes/Bin |
|---|---|---|
| D-2 | S | 2 cassettes (side by side) |
| | M／L | 1 cassette |
| BETACAM | S | 2 cassettes (side by side) |
| | L | 1 cassette |
| S-VHS | standard | 2 cassettes (side by side) |
| | C | Not supported |

Table 2-1-2 Cassette Size and Cassettes/Bin (section 2-1-2. (2))

(3) Maintenance

① To facilitate the maintenance, whether to pull out the VTR from the front or rear of the cart machine can be selected as required during installation.

② An exclusive RS-232C port[7] for connection with a maintenance terminal is provided as a standard feature.

(4) Others

① A barcode reader (BKFC)(optional) has the same format as the conventional library management system (LMS). It also supports the barcode of a code 39 format.

② A cassette tape is cued up by the following methods.

- Cued up based on a time code.
- Cued up based on a CTL.

The BZC-110 and BZC-120 support only the cuing up based on a time code.

③ The functions below are supported as cassette discrimination.

- Discrimination by bin number
  Function that reads the barcode reader data[8] of a cassette tape and reports the data to an external controller
- Discrimination by user bit (UB) data
  Function that senses the UB data of a cassette tape and reports the data to an external controller (A barcode reader is also required when UB data is read.)

---

[6] 1U: Approximately 4.25 cm

[7] Exclusive RS-232C port: D-sub 9-pin connector

[8] Barcode reader data: Read when an optional barcode reader (BKFC-200) is installed.

## 2-2. DESCRIPTION OF ELECTRIC SYSTEM

### 2-2-1. Circuit Outline

This section describes the electric circuits of this cart machine.
The electric system of this cart machine consists of the seven blocks below.

- Main CPU block
- Servo/motor driver block
- Display control block
- RS-422A interface block
- Protrusion sensor block
- Bin block
- Power supply block

### 2-2-2. Functions and Configuration of Blocks

The major functions of the above block and the subblock and board that constitute the block are described below. (Refer to Fig. 2-2-1.)

(1) Main CPU block

This block primarily controls the overall cart machine and communicates with the external controller. This block consists of the following boards.

① CPU-107 board (Main CPU)

② CK-39 board (Sync separator, TCR, and parallel I/O)

(2) Servo/motor driver block

This block primarily controls and drives the mechanical block such as a hand, elevator, and Y transfer. This block consists of the following subblocks and boards.

① CPU-118 board (Elevator control)

② IF-401 board (Interface in cart)

③ DR-187 board (Motor/door lock plunger driver)

④ Y block

- CB-50 board (Y motor harness connection)

⑤ Elevator block

- CB-47 board (elevator interface)
  SE-196 board ; Y sensor
  SE-196 board ; X sensor
  SE-195 board ; X encoder
  MT-65 board ; motor connector for X axis

- CB-48 board (connector for elevator)
  SE-195 board ; Z encoder
  MT-65 board ; motor connector for Z axis

- CB-49 board (connector for hand)
  SE-196 board ; Z sensor
  SE-197 board ; cassette A (right) sensor
  SE-197 board ; cassette B (left) sensor
  SE-223 board ; hand limit sensor
  SE-197 board ; hand encoder
  MT-65 board ; motor connector for H axis

⑥ Door lock open sensor block

SE-222 board ; door lock open sensor
CB-61 board ; connector for door lock plunger/sensor

(3) Display panel block

This block has the display panel installed at the top of this cart machine, and controls the key switch.

① DP-178 board (display panel control).

(4) RS-422A interface block

This block controls the VTR installed in this cart machine and the video/audio switch.

① IF-373 board (RS-422A interface)

(5) Protrusion sensor block

This block detects that a cassette tape protrudes from a bin block.

① SE-192 board (photo detector)

② SE-193 board (photo emitter)

(6) Bin block

This block senses the existence and size of a cassette in the bin block. As shown in Table 2-2-1, the type of the photo detector and photo emitter boards on the bin cassette sensor board of this block varies depending on the cassette to be used.

| board \ Bin Unit (Format) | BKFC-10B (BETACAM) | BKFC-10S (S-VHS) | BKFC-8D (D-2) |
|---|---|---|---|
| Photo Detector | SE-198 | SE-198 | SE-200 |
| Photo Emitter | SE-199A | SE-199B | SE-201 |

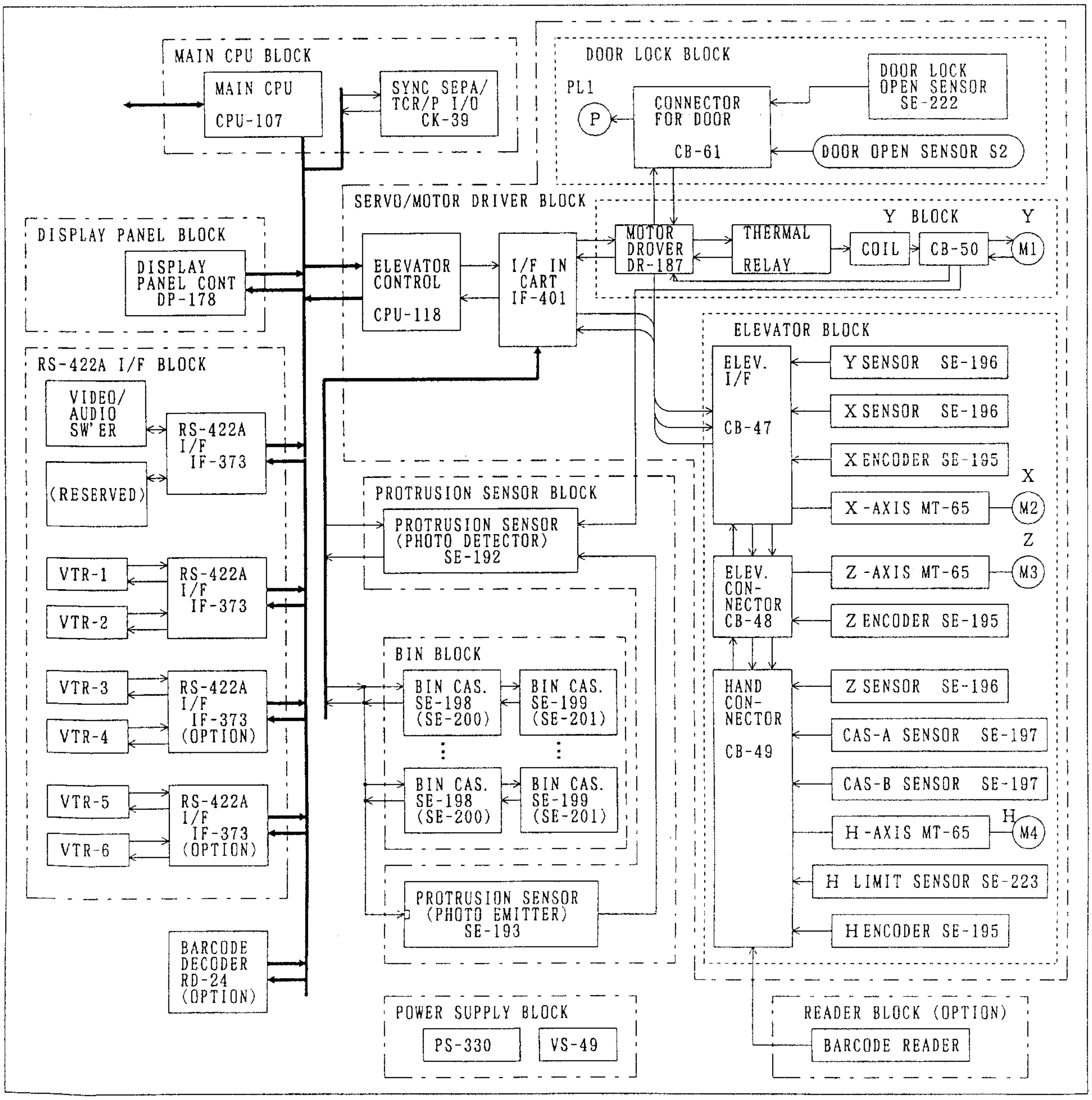
Table. 2-2-1 Photo detector Board and Photo emitter Board (section 2-2-2. (6))

(7) Power supply block

This is the power supply block of this cart machine. This block consists of the following boards.

① PS-330 board (power supply rectifier/regulator)

② VS-49 board (voltage selector)


MAIN CPU BLOCK
MAIN CPU
CPU-107
SYNC SEPA/
TCR/P I/O
CK-39
DOOR LOCK BLOCK
PL1
P
CONNECTOR
FOR DOOR
CB-61
DOOR LOCK
OPEN SENSOR
SE-222
DOOR OPEN SENSOR S2
DISPLAY PANEL BLOCK
DISPLAY
PANEL CONT
DP-178
SERVO/MOTOR DRIVER BLOCK
ELEVATOR
CONTROL
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MOTOR
DROVER
DR-187
THERMAL
RELAY
Y BLOCK
COIL
CB-50
Y
M1
RS-422A I/F BLOCK
VIDEO/
AUDIO
SW'ER
RS-422A
I/F
IF-373
(RESERVED)
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VTR-2
RS-422A
I/F
IF-373
VTR-3
VTR-4
RS-422A
I/F
IF-373
(OPTION)
VTR-5
VTR-6
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DECODER
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PROTRUSION SENSOR
(PHOTO DETECTOR)
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BIN CAS.
SE-198
(SE-200)
BIN CAS.
SE-199
(SE-201)
BIN CAS.
SE-198
(SE-200)
BIN CAS.
SE-199
(SE-201)
PROTRUSION SENSOR
(PHOTO EMITTER)
SE-193
POWER SUPPLY BLOCK
PS-330
VS-49
ELEVATOR BLOCK
ELEV.
I/F
CB-47
Y SENSOR SE-196
X SENSOR SE-196
X ENCODER SE-195
X
X-AXIS MT-65
M2
Z
ELEV.
CON-
NECTOR
CB-48
Z-AXIS MT-65
M3
Z ENCODER SE-195
HAND
CON-
NECTOR
CB-49
Z SENSOR SE-196
CAS-A SENSOR SE-197
CAS-B SENSOR SE-197
H
H-AXIS MT-65
M4
H LIMIT SENSOR SE-223
H ENCODER SE-195
READER BLOCK (OPTION)
BARCODE READER

Fig. 2-2-1 Overall Block Diagram (section 2-2-2.)

### 2-2-3. Features of Electric System

① This cart machine is constituted by a multiprocessor system that has independent CPUs for every function, and the CPU-107 board that controls the overall cart machine in the center. It reduces the load of each CPU, and simultaneously, improves the operation speed.

② The CPU-107 board communicates with other CPUs by using a dual port RAM.

③ The tape is cued up in frame accuracy from an external controller. The electric system also has the input connector of an external reference video signal. The CPU-107 and IF-373 boards use an interrupt based on this input connector for synchronization. Even if the input of the external reference video signal is interrupted, the system has a function that automatically generates a reference signal.

④ The execution time-specified macro command[1] from an external controller can also be executed.

⑤ The macro command and retry[2] can be processed by a low-level CPU. This reduces the load of a main CPU and enables a quick response.

⑥ To facilitate maintenance, each board (not including a slave board (i.e., sensor)) is a card type. The card-type board is inserted into the slot of the controller block on the rear panel.

Fig. 2-2-2 shows the slot positions of each board and the external connectors.

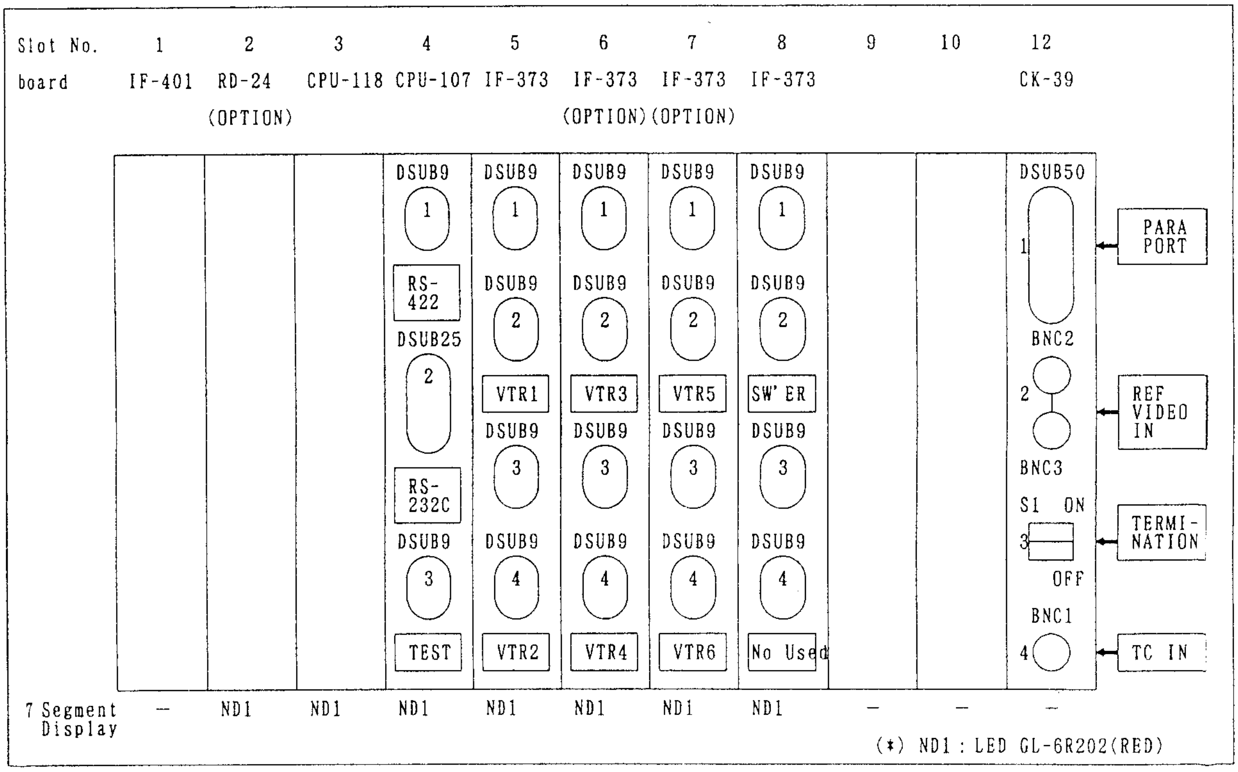

Slot No.
1
2
3
4
5
6
7
8
9
10
12
board
IF-401
RD-24 (OPTION)
CPU-118
CPU-107
IF-373
IF-373 (OPTION)
IF-373 (OPTION)
IF-373
CK-39
DSUB9
1
RS-422
DSUB25
2
RS-232C
DSUB9
3
TEST
DSUB9
1
DSUB9
2
VTR1
DSUB9
3
DSUB9
4
VTR2
VTR3
VTR4
VTR5
VTR6
SW' ER
No Used
DSUB50
1
PARA PORT
BNC2
2
REF VIDEO IN
BNC3
S1 ON
3
OFF
TERMI-NATION
BNC1
4
TC IN
7 Segment Display
ND1
(*) ND1 : LED GL-6R202(RED)

Fig. 2-2-2 Slot Positions on Each Board of Controller Block and External Connectors (section 2-2-3.)

---

[1] Macro command: In a BFC-1 protocol, the command whose execution is not completed immediately after a command was issued is called a macro instruction or macro commnad. (Refer to the Flexicart Protocol and Command Specifications.)

[2] Retry: When a low-level CPU failed in executing the instruction from a high-level CPU, it executes again without the instruction from the high-level CPU.

⑦ A CPU uses an internal SIO[3] function to ensure high integration and high reliability.

⑧ The board on which a CPU is mounted has a seven-segment LED display element. The LED display element displays the self-diagnosis results of the board during the power-on sequence and the condition of the board during operation. (Refer to Fig. 2-2-2.)

⑨ Each sensor is an optical type that is excellent in durability and noise resistance. It turns on and off the photo emitter side as required.

---

[3] SIO: Serial Input Output

### 2-2-4. CPU-107 Board

The CPU-107 board communicates with a high-level external controller and plays a leading part in this cart machine.

(1) CPU (IC5) (Refer to Fig. 2-2-3.)

A clock of 16 MHz generated by a clock generator (IC9)(X2: 32 MHz) is used for the operation clock of the CPU (IC5: TMP68301F) on this board. A clock of 4.9152 MHz generated by a clock generator (X1, IC4) is used to generate the baud rate of a serial port[1]. There are three serial input/output signals. Two serial input/output signals are used as RS-232C, and one signal is used as RS-422A.

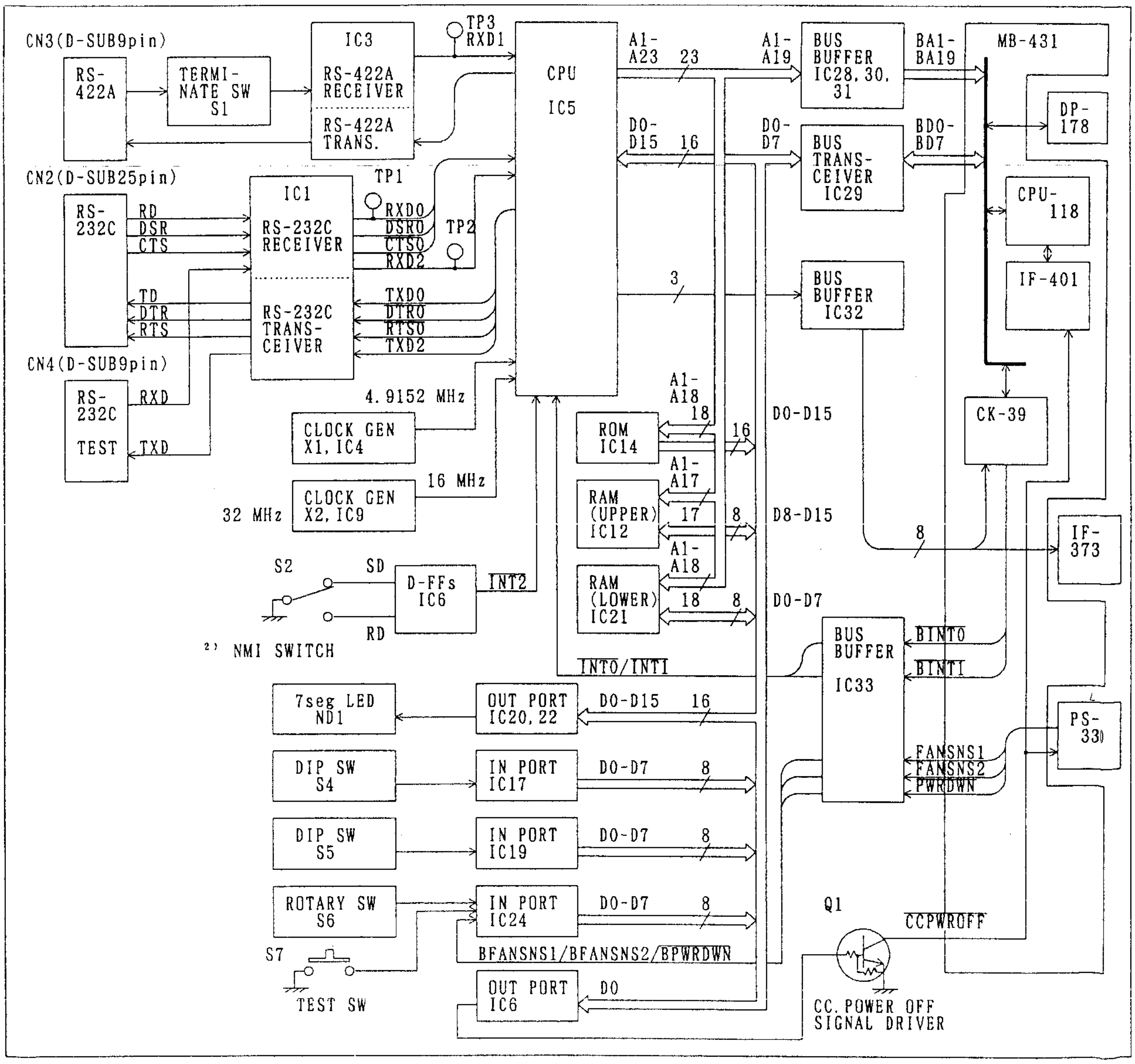

CN3(D-SUB9pin)
RS-422A
TERMINATE SW S1
IC3
RS-422A RECEIVER
RS-422A TRANS.
TP3 RXD1
CPU IC5
CN2(D-SUB25pin)
RS-232C
RD
DSR
CTS
TD
DTR
RTS
IC1
RS-232C RECEIVER
RS-232C TRANS-CEIVER
TP1
RXD0
DSR0
CTS0
RXD2
TP2
TXD0
DTR0
RTS0
TXD2
CN4(D-SUB9pin)
RS-232C TEST
RXD
TXD
4.9152 MHz
CLOCK GEN X1, IC4
16 MHz
CLOCK GEN X2, IC9
32 MHz
S2
SD
RD
D-FFs IC6
INT2
NMI SWITCH
A1-A23 23
D0-D15 16
A1-A19
D0-D7
BUS BUFFER IC28, 30, 31
BUS TRANS-CEIVER IC29
BA1-BA19
BD0-BD7
MB-431
DP-178
CPU-118
IF-401
3
BUS BUFFER IC32
A1-A18 18
ROM IC14
16
A1-A17
RAM (UPPER) IC12
17
8
A1-A18
RAM (LOWER) IC21
18
8
D0-D15
D8-D15
D0-D7
CK-39
8
IF-373
BUS BUFFER IC33
BINT0
BINT1
INT0/INT1
PS-330
FANSNS1
FANSNS2
PWRDWN
7seg LED ND1
OUT PORT IC20, 22
D0-D15 16
DIP SW S4
IN PORT IC17
D0-D7 8
DIP SW S5
IN PORT IC19
D0-D7 8
ROTARY SW S6
IN PORT IC24
D0-D7 8
S7
TEST SW
BFANSNS1/BFANSNS2/BPWRDWN
OUT PORT IC6
D0
Q1
CCPWROFF
CC.POWER OFF SIGNAL DRIVER

Fig. 2-2-3 CPU-107 Board Block (section 2-2-4.)

---

[1] Baud rate of serial port: 38,400 bps (fixed) for RS-422A, and 4,800, 9,600, 19,200, and 38,400 bps (selected) for RS-232C.

[2] NMI switch: Non-mask erase interrupt switch. (Usually, unused.)

The interrupt has the same eight priority levels as another 68k series[3]. A 7-channel interrupt is allowed inside the CPU, and a 3-channel interrupt is allowed outside the CPU. The number of data buses is 16, and the number of address buses is 23.

(2) Memory (ROM: IC14, RAM: IC12 and IC21)(Refer to Fig. 2-2-3.)

ROM (IC14) uses TMS27C240-12 of 512k bytes, and RAM (IC12 and IC21) uses HM628128 of 512k (256k × 2) bytes. RAM uses IC21 as low-order data (D0 to D7) and IC12 as high-order data (D8 to D15).

(3) Serial input/output port (Refer to Fig. 2-2-3.)

A serial port consists of IC1 and IC3. The serial port uses IC1 (MAX235) for RS-232C and IC3 (MC34051P) for RS-422A. RS-422A has a switch (S1) that turns on and off the termination[4] for a multidrop. This cart machine enables the connection by a multidrop only when RS-422A is connected.

(4) Clock circuit (Refer to Fig. 2-2-3.)

A clock circuit consists of X1, IC4, X2, and IC9, and primarily generates two clocks. One clock is a clock of 16 MHz that is generated by X2 and IC9. It is used for a CPU. The other clock (4.9152 MHz) that is generated by X1 and IC4 is waveform-shaped and input to a CPU (IC5). It is used for a serial port.

(5) Reset circuit (Refer to Fig. 2-2-4.)

This reset circuit activates the reset switch (S3) on the CPU-107 board, or resets a CPU (IC5) and its peripheral circuits when a supply voltage of 5 V decreases and when a power failure exceeding a fixed value occurs.
When the reset switch (S3) is set to ON, a $\overline{\text{RESET}}$ signal is output from pin 5 of a reset generator (IC10). The output signal resets a CPU (IC5) and its peripheral circuits via a diode (D1). It also turns on a $\overline{\text{HALT}}$ line via a diode (D2). When the $\overline{\text{HALT}}$ line is set to ON, a photodiode (D3) lights to report that the CPU (IC5) is in the HALT state. When a voltage of 5 V that is input to pin 7 (SENSE) of IC10 is lower than the charge voltage of a capacitor (C15) connected to pin 3 (CT) of IC10, pin 5 ($\overline{\text{RESET}}$) of IC10 is turned on to reset the CPU and its peripheral circuits. (The voltage to be reset is approximately 4.75 V.)

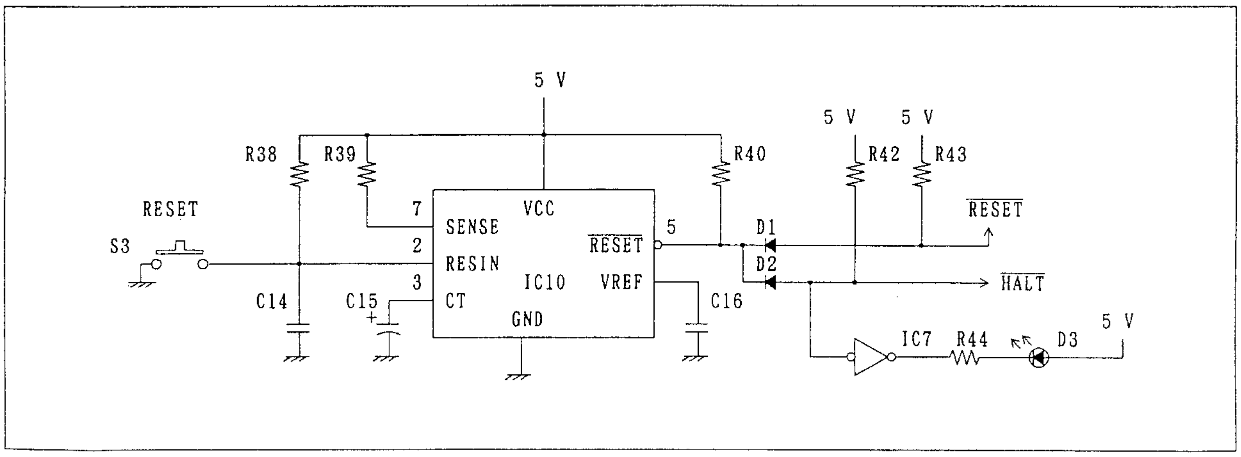


Fig. 2-2-4 Reset Circuit (section 2-2-4. (5))

---

[3] 68k series: MC68000 series (Motorola)

[4] Termination for multidrop: The last connector is terminated for matching by a resistor when connectors are multiplex-connected in parallel.

(6) 7-segment LED (ND1)(Refer to Fig. 2-2-3.)

The CPU-107 board mounts a 7-segment LED (ND1) that indicates the state of a CPU (IC5). This LED is controlled by a D-type flip-flop circuit (IC20 and IC22). The display data output from the CPU (IC5) is latched by IC20 and IC22 and displayed by the LED (ND1).

(7) Inport (IC17, IC19, and IC24)(Refer to Fig. 2-2-3.)

IC17, IC19, and IC24 are a 3-stage non-inverting buffer that reads the set value of DIP switches (S4 and S5) and rotary switch (S6). An alarm signal for a power down is input to this port to sense and display the operation state.

(8) Buffer (IC28, IC30, IC31, IC32, and IC33)(Refer to Fig. 2-2-3.)

The CPU-107 board is connected to the bus on the motherboard via this bus buffer (IC28, IC30, IC31, IC32, and IC33: 3-stage buffer and line driver).

(9) Memory map (Refer to Table 2-2-2.)

The memory map on the CPU-107 board is shown below.

| | After Reset | | After changed ROM Address |
|---|---|---|---|
| $FF:FFFF | Internal Register block | $FF:FFFF | Internal Register block |
| $FF:C000 | Reserved | $FF:C000 | Reserved |
| $F0:0000 | External I/O (CPU-107) | $F0:0000 | External I/O (CPU-107) |
| $E0:0000 | Reserved | $E0:0000 | Reserved |
| $D0:8000 | External I/O (CK-39) | $D0:8000 | External I/O (CK-39) |
| $D0:0000 | External Common RAM | $D0:0000 | External Common RAM |
| $A0:0000 | Reserved | $A0:0000 | Reserved |
| | | $28:0000 | Reserved |
| | | $24:0000 | ROM (2M bit) |
| | | $20:0000 | Reserved |
| | | $10:0000 | Reserved |
| $08:0000 | Reserved | | |
| $04:0000 | ROM (2M bit) | $04:0000 | Main RAM (2M bit) |
| $00:0000 | | $00:0000 | |

Table. 2-2-2 Memory Map on the CPU-107 Board (section 2-2-4. (9))

## 2-2-5. CK-39 Board

The CK-39 board primarily consists of the two circuits below.

① One is a sync separator circuit that generates a frame pulse from the input signal of an external reference signal, and an internal reference signal generator circuit (IC27: CXD1159Q) that generates a field equalizing pulse by the internal reference signal produced when no external reference signal is input.
This field equalizing pulse is used as a drive signal for the CPU-107 and CPU-118 board. In addition, a circuit (IC21 and D1) that detects and displays the external reference signal is also provided.

② Another is a time code reader (IC23: CX7912). The time code reader converts the external time code signal input from the BNC1 connector on the rear panel into serial data and uses it as the reference time of a chart machine's control system.

Moreover, the CK-39 board is provided with a parallel outport and parallel inport (CN2: D-Sub 50-pin connector) via a photocoupler.

(1) Sync generator (IC27)(Refer to Fig. 2-2-5.)

The sync generator circuit generates the field signals for NTSC and PAL modes.
When there is no external reference signal, the sync generator (IC27: CXD1159Q) generates fields signals in the free-running mode to produce the reference signal of this cart machine.
IC24 and IC25 are a sync separator in the PAL and NTSC modes. They produce a VINT signal for the sync generator (IC27). The VINT signal is input to pin 4 of an external reference signal detector (IC28). The output signal drives an LED (D1). The LED lights to report that the external reference signal was input.
The PAL/NTSC mode select signal from the CPU-107 board is input through a data bus driver (IC3) and buffer (IC12 and IC22) to pins 9, 10, and 11 of a selector (C26).

(2) Time code reader (IC23)(Refer to Fig. 2-2-6.)

The external time code signal from the BNC connector (BNC1) is converted into serial data using a time code reader (IC23: CX7912) and output to four-bit memory (IC4 and IC10).
The input/output timing chart of the time code reader (IC23) is shown in Fig. 2-2-7.

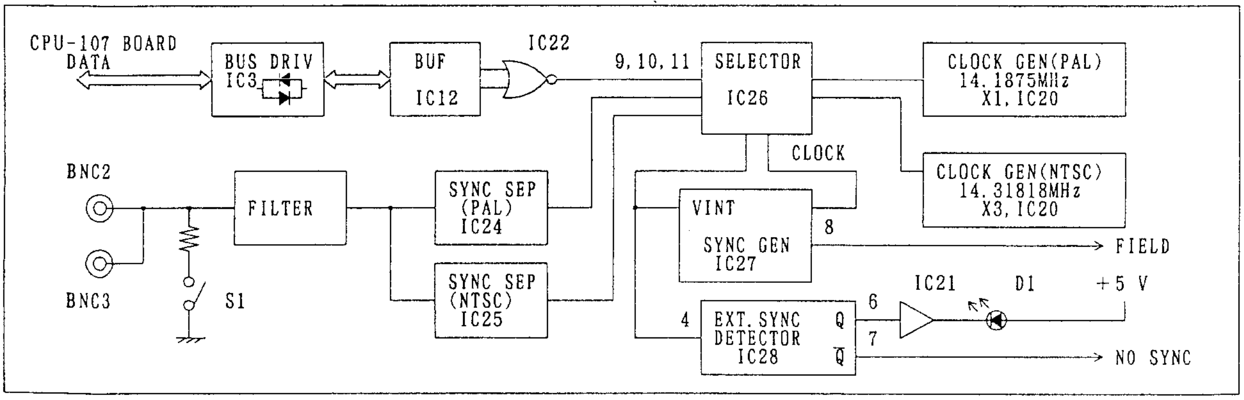

CPU-107 BOARD
DATA
BUS DRIV
IC3
BUF
IC12
IC22
9, 10, 11
SELECTOR
IC26
CLOCK GEN(PAL)
14.1875MHz
X1, IC20
CLOCK
CLOCK GEN(NTSC)
14.31818MHz
X3, IC20
BNC2
FILTER
SYNC SEP
(PAL)
IC24
VINT
SYNC GEN
IC27
8
FIELD
BNC3
S1
SYNC SEP
(NTSC)
IC25
IC21
D1
+5 V
4
EXT. SYNC
DETECTOR
IC28
Q
6
7
NO SYNC

Fig. 2-2-5 Sync Generator (section 2-2-5. (1))

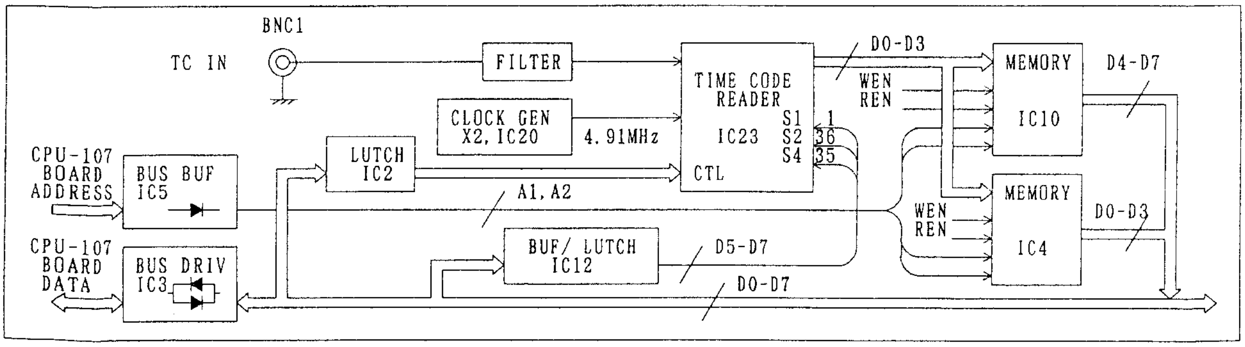

BNC1
TC IN
FILTER
TIME CODE
READER
IC23
S1
S2
S4
1
36
35
CTL
D0-D3
WEN
REN
MEMORY
IC10
D4-D7
CLOCK GEN
X2, IC20
4.91MHz
CPU-107
BOARD
ADDRESS
BUS BUF
IC5
LUTCH
IC2
A1, A2
WEN
REN
MEMORY
IC4
D0-D3
CPU-107
BOARD
DATA
BUS DRIV
IC3
BUF/ LUTCH
IC12
D5-D7
D0-D7

Fig. 2-2-6 Time Code Reader (section 2-2-5. (2))

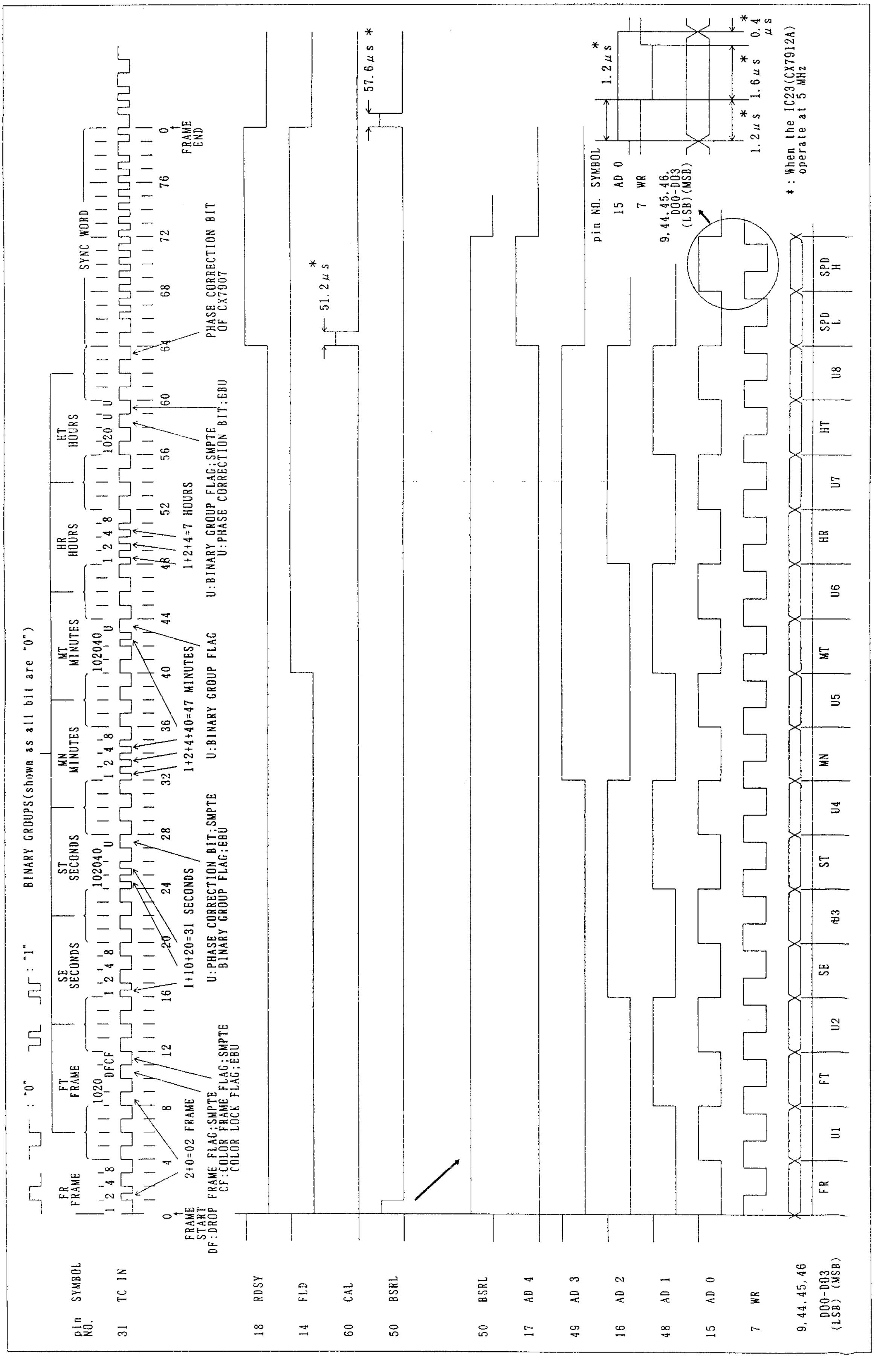

pin NO.
SYMBOL
31 TC IN
18 RDSY
14 FLD
60 CAL
50 BSRL
50 BSRL
17 AD 4
49 AD 3
16 AD 2
48 AD 1
15 AD 0
7 WR
9,44,45,46 D00-D03 (LSB) (MSB)
: "0"
: "1"
BINARY GROUPS(shown as all bit are "0")
FR FRAME
FT FRAME
SE SECONDS
ST SECONDS
MN MINUTES
MT MINUTES
HR HOURS
HT HOURS
SYNC WORD
1 2 4 8
10 20
DF CF
10 20 40
U
0
FRAME START
DF:DROP FRAME FLAG;SMPTE
CF:COLOR FRAME FLAG;SMPTE
COLOR LOCK FLAG;EBU
2+0=02 FRAME
1+10+20=31 SECONDS
U:PHASE CORRECTION BIT;SMPTE
BINARY GROUP FLAG;EBU
1+2+4+40=47 MINUTES
U:BINARY GROUP FLAG
1+2+4=7 HOURS
U:BINARY GROUP FLAG;SMPTE
U:PHASE CORRECTION BIT;EBU
PHASE CORRECTION BIT OF CX7907
4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76
0
FRAME END
51.2 μs *
57.6 μs *
1.2 μs *
1.6 μs *
0.4 μs *
FR U1 FT U2 SE U3 ST U4 MN U5 MT U6 HR U7 HT U8 SPD L SPD H
*: When the IC23(CX7912A) operate at 5 MHz

*Fig. 2-2-7 Input/Output Timing Chart of Time Code Reader (IC23) (section 2-2-5. (2))*

The television format in the time code reader (IC23) is selected by the mode select signal from a latch circuit (IC12). As shown in Table 2-2-3, the television format is selected by the mode select signal.

(3) Data memory (IC4 and IC10)(Refer to Fig. 2-2-6.)

For the serial output signal from a time code reader (IC23), the address signals (A1 and A2) from a bus buffer (IC5) and a write enable control signal (WEN) are input to four-bit memory (IC4 and IC10: SN74LS670), and frame ×1/frame ×10, second ×1/second ×10, minute ×1/minute ×10, and hour ×1/hour × 10 are written in IC4 and IC10 as D0 to D3 and D4 to D7. When a read enable control signal (REN) and address signals (A1 and A2) are used instead of the write enable control signal (WEN), data is output from IC4 and IC10. (Refer to Fig. 2-2-8.)

| Mode Select Signal | | | Format | Frame |
|---|---|---|---|---|
| S4 | S2 | S4 | | |
| 0 | 0 | 0 | Film | 24 |
| 0 | 0 | 1 | Not allowed | — |
| 0 | 1 | 0 | Not allowed | — |
| 0 | 1 | 1 | Not allowed | — |
| 1 | 0 | 0 | PAL, SECAM | 25 |
| 1 | 0 | 1 | Not allowed | — |
| 1 | 1 | 0 | NTSC(Non Drop Frame) | 30 |
| 1 | 1 | 1 | NTSC(Drop Frame) | 30 |

(0 : "Low" level, 1 : "High" level)

Table. 2-2-3 Television Format Selection (section 2-2-5. (2))

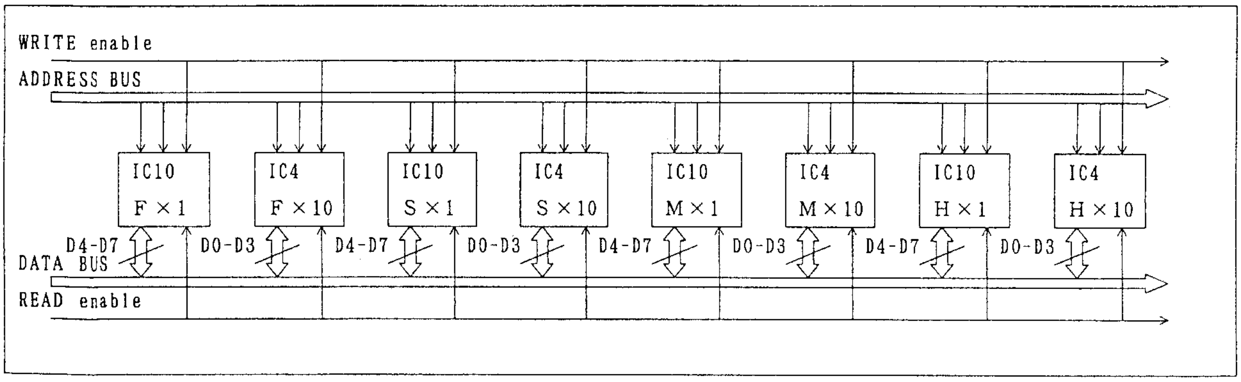


Fig. 2-2-8 Conceptual Diagram of Memory (section 2-2-5. (3))

(4) Memory map on CK-39 board (Refer to Table 2-2-4.)

The memory map on the CK-39 board is shown in the table below.

| Register | Bit | Function | Register | Bit | Function |
|---|---|---|---|---|---|
| IN 0<br>$D0:0001 | bit7 – bit4 | TIME CODE (FRAME × 1 ) | IN 1<br>$D0:0003 | bit7 – bit4 | TIME CODE (SECOND × 1 ) |
| | bit3 – bit0 | TIME CODE (FRAME × 10) | | bit3 – bit0 | TIME CODE (SECOND × 10) |
| IN 2<br>$D0:0005 | bit7 – bit4 | TIME CODE (MINUTE × 1 ) | IN 3<br>$D0:0007 | bit7 – bit4 | TIME CODE (HOUR × 1 ) |
| | bit3 – bit0 | TIME CODE (MINUTE × 10) | | bit3 – bit0 | TIME CODE (HOUR × 10) |
| IN 4<br>$D0:0009 | bit7 | TC DATA ERROR | IN 5<br>$D0:000A | bit7 | INPORT 1 |
| | bit6 | LTD/TCL SELECT | | bit6 | INPORT 2 |
| | bit5 | NO EXT SYNC | | bit5 | INPORT 3 |
| | bit4 | | | bit4 | INPORT 4 |
| | bit3 | INPORT 17 | | bit3 | INPORT 5 |
| | bit2 | INPORT 18 | | bit2 | INPORT 6 |
| | bit1 | INPORT 19 | | bit1 | INPORT 7 |
| | bit0 | INPORT 20 | | bit0 | INPORT 8 |
| IN 6<br>$D0:000D | bit7 | INPORT 9 | | | |
| | bit6 | INPORT 10 | | | |
| | bit5 | INPORT 11 | | | |
| | bit4 | INPORT 12 | | | |
| | bit3 | INPORT 13 | | | |
| | bit2 | INPORT 14 | | | |
| | bit1 | INPORT 15 | | | |
| | bit0 | INPORT 16 | | | |
| OUT 0<br>$D0:0001 | bit7 | NTSC/PAL SET S1 | OUT 1<br>$D0:0003 | bit7 | SLTC |
| | bit6 | NTSC/PAL SET S2 | | bit6 | |
| | bit5 | NTSC/PAL SET S4 | | bit5 | CTLi |
| | bit4 | | | bit4 | RSTi |
| | bit3 | OUTPORT 17 | | bit3 | |
| | bit2 | OUTPORT 18 | | bit2 | |
| | bit1 | OUTPORT 19 | | bit1 | oUDS |
| | bit0 | OUTPORT 20 | | bit0 | DMSS |
| OUT 2<br>$D0:0005 | bit7 | OUTPORT 1 | OUT 3<br>$D0:0007 | bit7 | OUTPORT 9 |
| | bit6 | OUTPORT 2 | | bit6 | OUTPORT 10 |
| | bit5 | OUTPORT 3 | | bit5 | OUTPORT 11 |
| | bit4 | OUTPORT 4 | | bit4 | OUTPORT 12 |
| | bit3 | OUTPORT 5 | | bit3 | OUTPORT 13 |
| | bit2 | OUTPORT 6 | | bit2 | OUTPORT 14 |
| | bit1 | OUTPORT 7 | | bit1 | OUTPORT 15 |
| | bit0 | OUTPORT 8 | | bit0 | OUTPORT 16 |

Table. 2-2-4 Memory Map on the CK-39 Board (section 2-2-5. (4))

## 2-2-6. CPU-118 Board

The CPU-118 board controls an elevator via the IF-401 and DR-187 boards.
The CPU-118 board mounts a CPU, ROM, and RAM that control the mechanical block of this cart machine. A Y transfer and elevator are controlled by the data calculated on the CPU-118 board via the IF-401 board that functions as an interface of the CPU-118 board and mechanical block.
The CPU-118 board interfaces with a main CPU by the dual port RAM on the CPU-118 board.
The major circuits on the CPU-118 board are described next.

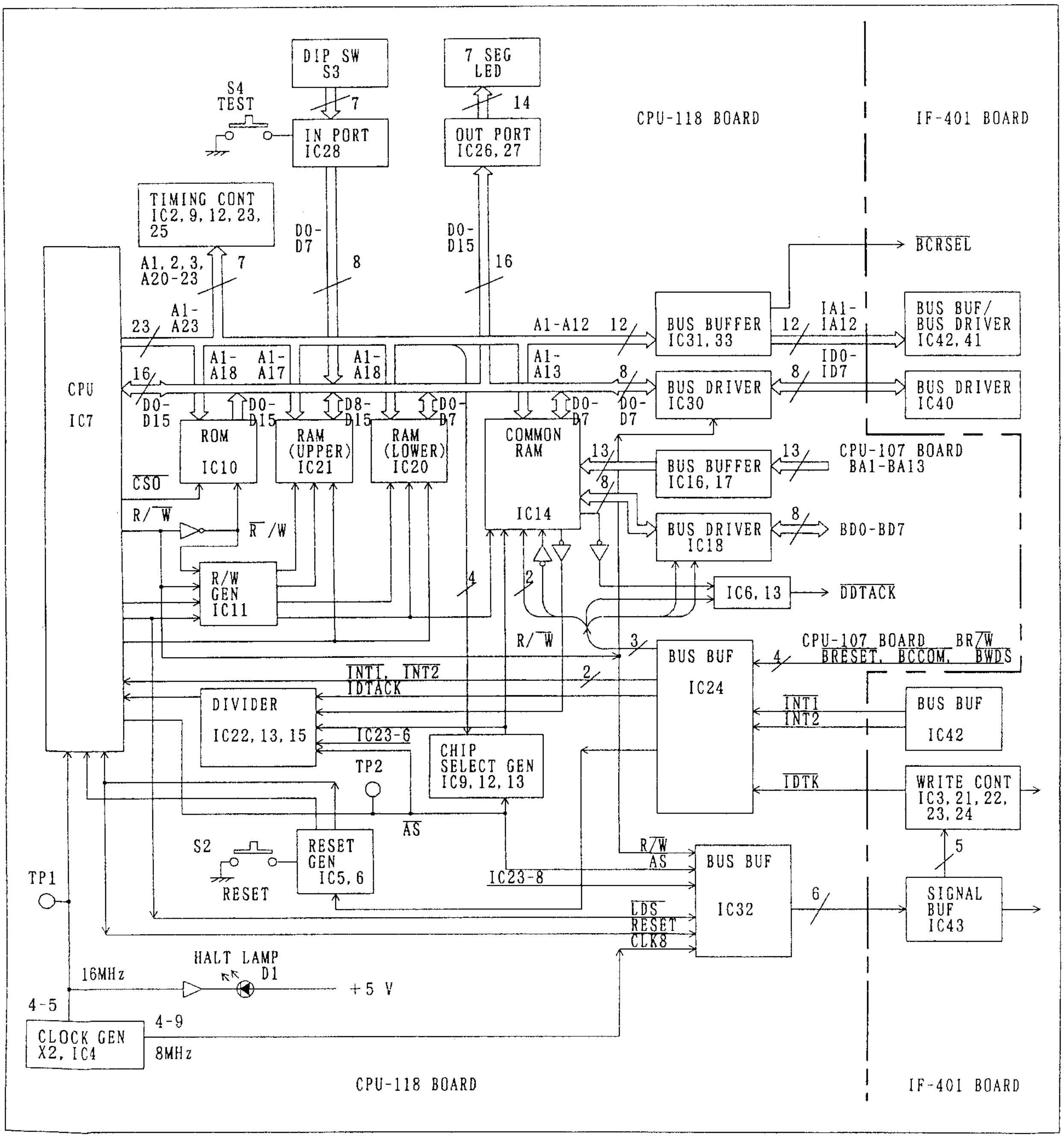

DIP SW S3
7 SEG LED
S4 TEST
7
14
IN PORT IC28
OUT PORT IC26, 27
CPU-118 BOARD
IF-401 BOARD
TIMING CONT IC2, 9, 12, 23, 25
D0-D7
D0-D15
A1, 2, 3, A20-23
7
8
16
BCRSEL
A1-A23
23
A1-A12
12
BUS BUFFER IC31, 33
12
IA1-IA12
BUS BUF/ BUS DRIVER IC42, 41
A1-A18
A1-A17
A1-A18
A1-A13
8
ID0-ID7
8
16
CPU IC7
D0-D15
D0-D15
D8-D15
D0-D7
D0-D7
D0-D7
BUS DRIVER IC30
BUS DRIVER IC40
ROM IC10
RAM (UPPER) IC21
RAM (LOWER) IC20
COMMON RAM IC14
13
13
CPU-107 BOARD BA1-BA13
BUS BUFFER IC16, 17
8
CS0
R/W
R/W
8
BUS DRIVER IC18
BD0-BD7
R/W GEN IC11
4
2
IC6, 13
DDTACK
R/W
3
BUS BUF IC24
4
CPU-107 BOARD BR/W BRESET, BCCOM, BWDS
INT1, INT2 IDTACK
2
DIVIDER IC22, 13, 15
IC23-6
INT1
INT2
BUS BUF IC42
CHIP SELECT GEN IC9, 12, 13
TP2
IDTK
WRITE CONT IC3, 21, 22, 23, 24
AS
S2
RESET GEN IC5, 6
RESET
R/W
AS
IC23-8
BUS BUF IC32
5
TP1
LDS
RESET
CLK8
6
SIGNAL BUF IC43
HALT LAMP D1
16MHz
+5 V
4-5
4-9
CLOCK GEN X2, IC4
8MHz
CPU-118 BOARD
IF-401 BOARD

Fig. 2-2-9 CPU-118 Board Block (section 2-2-6.)

① CPU (IC7)

The CPU (IC7: TMP68301F) used for this CPU-118 board is the same as the CPU (IC5) on the CPU-107 board except for a function and some I/O address map.

② Memory mapped I/O (Refer to Table 2-2-5.)

The I/O port on the CPU-118 board is used to communicate with another board (IF-401 board) in the two-way direction or to set the DIP switches and 7-segment LEDs on the board at the factory.
For an interface with other boards, the CPU board communicates with X, Y, Z, and H encoders and each sensor in serial and communicates with the IF-401 board to be driven. These I/O ports are mapped into as memory map.
Since the CPU-118 board is away from the X, Y,Z, and H encoders, this cart machine sends and receives data using a driver based on an RS-422A format so as to reduce a noise and improve reliability. Using each sensor of an optical type, this cart machine also communicates with data in a TTL level. It is not necessary to replace parts in the normal life time of products.

③ Port communication (Refer to Table 2-2-5.)

The functions of the CPU-118 boards as a port communication are shown in Table 2-2-5.

| Destination | Functions of port on CPU-118 board |
|---|---|
| CPU-107 board | • Exchanges data, statues, and commands with the CPU-107 board (for CCC[5] system operations of the CPU-118 board) |
| IF-401 board | • Exchanges data and statuses with the IF-401 board<br>• Receive the interrupt command from the IF-401 board |
| RD-24 board (OPTION) | • Exchanges data, statues, and commands with the RD-24 board that controls a barcode reader |
| 7 SEG. LED | • Displays the test and error data |
| TEST SW & DIP SW | • Used for a factory test |

Table. 2-2-5 Port Communication (section 2-2-6.)

④ Communication with CPU-107 board (Refer to Fig. 2-2-9.)

The communication with the CPU-107 board is performed via the bus buffers (IC16 and IC17) of address buses (BA1 to BA13) and the bus transceiver (IC18) of data buses (BD0 to BD7).

Control signals (BR/$\overline{\text{W}}$, $\overline{\text{BCCOM}}$, $\overline{\text{BWDS}}$, and $\overline{\text{BRESET}}$) communicate via a buffer (IC24).

⑤ Communication with IF-401 board (Refer to Fig. 2-2-9.)

The communication with the IF-401 board is performed via the bus buffers (IC31 and IC33) of address buses (IA1 to IA12) and the bus transceiver (IC30) of data buses (ID0 to ID7). A control signal communicates via a buffer (IC24).
This communication is controlled by the CPU-118 board and executed by the write control circuits (IC22 and IC23) on the IF-401 board. Shift registers (IC22 and IC23) are synchronized using a system clock of 8 MHz that is input from IC32 on the CPU-118 board. IC23 is active only when it exchanges data with the CPU-118 and IF-401 boards. IC23 is inactive for except the above.

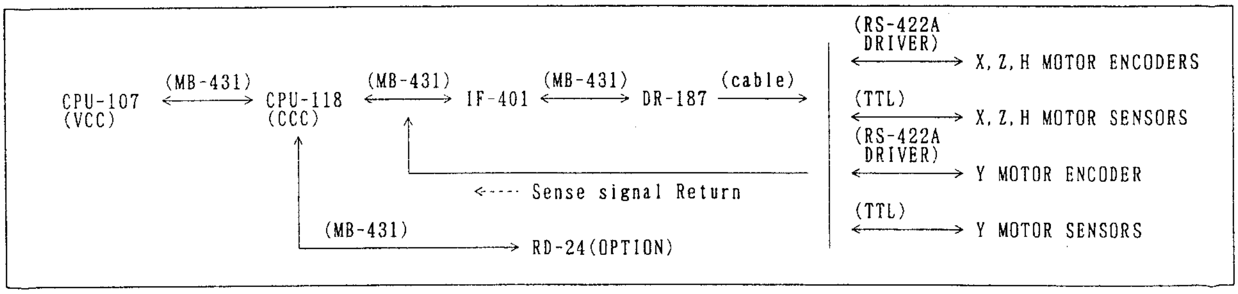


Fig. 2-2-10 Conceptual Diagram of CPU-118 Board Communication (section 2-2-6.)

---

[5] CCC (Cassette console controller): Indicates the function of the CPU-118 board.

An interrupt priority level is 7 to 0. The priority level is used to supervise the pulse of a Y motor, and the pulses of X and Z motors. Interrupt control signals are $\overline{\text{INT1}}$ and $\overline{\text{INT2}}$.

⑥ 7-segment LED (ND1)(Refer to Fig. 2-2-9.)

The status and error code on the CPU-118 board that is output from a CPU (IC7) are latched using a D-type flip-flop circuit (IC26 and IC27) and displayed by a 7-segment LED (ND1).

⑦ Test switch and DIP switch (Refer to Fig. 2-2-9.)

The test switch (S4) and DIP switch (S3) are used for a factory test.

(1) CCC functions of CPU-118 board

The CPU-118 board controls all the mechanical blocks (elevator, hand, etc.). A control instruction is sent from the CPU-107 board via the dual port RAM on the CPU-118 board. The major functions of the CPU-118 board are described below.

- Controls an elevator[6].
- Controls a Y transfer[7].
- Senses the state of a bin block and transmits cassette information to the CPU-107 board.
- Senses the system configuration information learned during initialization and stores it in a RAM on the CPU-118 board.
- Controls a bin lamp.
- Executes the macro command from the CPU-107 board (cassette movement and initialization)
- Controls the door open operation.

When the door open key (S8) (on the DP-178 board) is pressed, the switch is set to ON. The elevator automatically moves to the top position of the cart machine, the front door is unlocked, and the door is opened automatically. The door open sensor inside the door is then activated, and the motor power is cut off and stops. The reason is that the elevator obstructs the cassette insertion and maintenance or it is damaged by an obstacle.

Unlike another cassette changer, in this cart machine, a special adapter is not installed in the VTR. Even if a cassette is left at the entrance of the VTR compartment when the power is turned on, the cassette cannot be detected. Therefore, the cassette that was left in the VTR is detected using cassette sensors of the elevator after the power was turned on.

(2) Elevator and Y transfer initialization (Refer to Fig. 2-2-9.)

There are two ways to initialize an elevator and Y transfer. One is to press the INITIAL key on the display panel and receive key data from the DP-178 board for initialization. The other is to receive the application software command from the CPU-107 board for initialization. An initialize software routine is recorded in an EPROM (IC10: TMS27C240) on the CPU-118 board, learned by the cart configuration and position data recorded in the EPROM during initialization using the CCC function of the CPU-107 board, and initialized.
All the bins, and VTR configuration and position data are sensed and recorded in an SRAM (IC21 and IC20: HM628128). After that, a correct physical offset table for the sensed data is read from the PROM to the SRAM according to the routine operation.

① The type and quantity of a VTR are returned through the IF-373, CPU-107, then CPU-118 boards by the status information of the VTR. Therefore, the VTR receives an inquiry about the power system and communication format.

② The CPU-118 board identifies the data on the bin type, configuration, and cassette from the bin cassette sensors on the SE-198 and ES-199 boards or SE-200 and SE-201 boards.
The bin unit number is manually set by the rotary switch on the front panel of a bin.

---

[6] Elevator control: Platform to move the hand assembly that catches a cassette. The system that transports a cassette between the VTR and bin is called an elevator. To control an elevator is that the CPU-118 board manages D-2, BETACAM, and S-VHS cassettes.

[7] Y transfer: Mechanism that moves the elevator block between a bin unit and VTR in the Y direction. The mechanism consists of a Y drive assembly and counter weight assembly.

The CPU-118 board reads the data. (The bin number is Nos. 0, 1, 2, 3, ... in the descending order.) When the CPU-118 board senses the bin position of a cassette, only Y parameters load the sensed value into an SRAM during initialization. For X and Z parameters, bin standard parameters are loaded from a ROM to an SRAM.

③ An initial elevator moves from the origin point in a top shutter plate at the uppermost position of a Y linear way to the bottom. For a bin shutter plate (larger) and VTR shutter plate (smaller), the numeric value is counted with the origin point in a top shutter plate as zero ("0").
The top shutter plate position is the reference of a rack-mounting reference pin in the horizontal direction.
In each bin and VTR, Y parameters[8] are loaded into an SRAM (IC21 and IC20). (Refer to Figs. 2-2-11 and 2-2-12.)
The reference operation of each bin and VTR in an elevator is executed by the routine operation table of X, Y, and Z parameters recorded in an EPROM (IC10).

(3) 'CASSETTE MOVE"[9] command process on CPU-118 board

Basic stage

| | |
|---|---|
| First stage | : An elevator moves to the bin (source bin) or VTR that contains the cassette to be extracted. |
| Second stage | : A hand extracts the cassette from the source bin or VTR. |
| Third stage | : An elevator transports the cassette to the destination bin and VTR. |
| Fourth stage | : A hand inserts the cassette into the destination bin or VTR. |

The first stage uses X and Y servos. The second stage uses Z and H motors. The third stage is executed in the same way as in the first stage. The fourth stage activates Z and H motors.

(1-a): The CPU-107 board checks the present state of the CPU-118 board and sends a "CASSETTE MOVE" command to the CPU-118 board so as to return from the source bin and VTR and the destination bin and VTR.

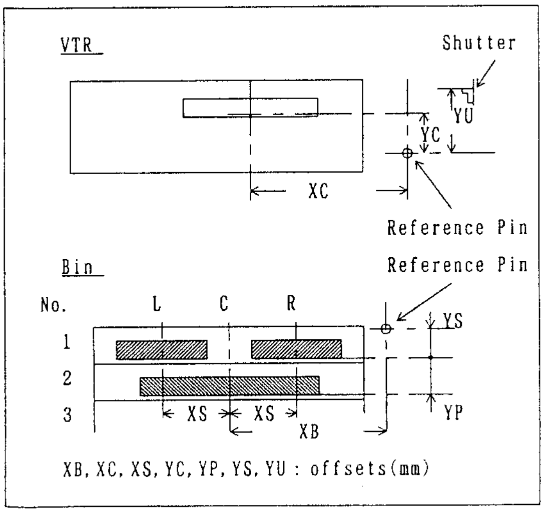


Fig. 2-2-11 VTR and Bin, and Reference Pins (section 2-2-6. (2))

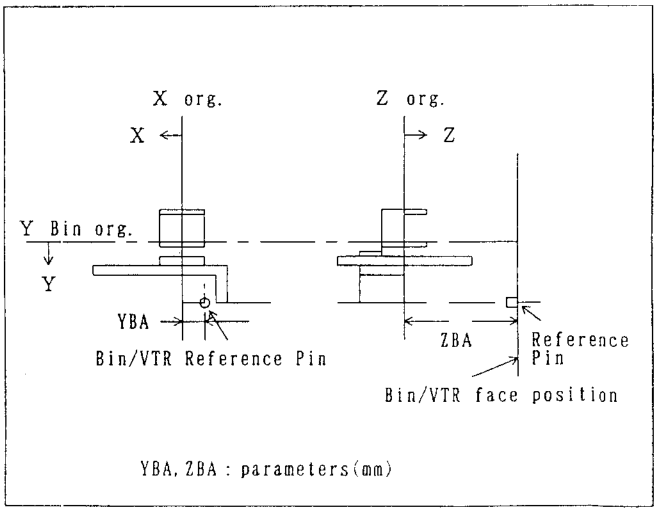


Fig. 2-2-12 X, Y, and Z Origin Positions (section 2-2-6. (2))

---

[8] Y parameters: Constant determined by the type and size of a cassette (in units of mm)

[9] "CASSETTE MOVE": Refer to the Flexicart Protocol and Command Specifications.

Sensed data and error macro information⁽¹⁰⁾ are returned to the CPU-107 board immediately after command execution. The returned macro information is as follows:

- Execution OK
- Senses an error before execution.
- Senses an error during execution.

The CPU-118 board executes the four basic stages described above and transports the cassette from the source place to the destination.

(1-b): The CPU-118 board obtains the physical positions of X and Y axes and the speed information of a motor from an SRAM (IC20 and IC21: HM628128). The servo software calculates acceleration and deceleration, and outputs the information to X and Y motors. In this stage, the Z assembly is in the normal origin position (not including when a cassette is held). The finger plate of a hand has nothing at that time. The finger plate is opened with cassette height + tolerance of 6 mm (each 3 mm in the vertical direction) in the Y direction. (Refer to Figs. 2-2-13 and 2-2-14.)

(1-c): The motion of the source place to the destination is sensed by the encoder pulse counters of each motor on the IF-401 board. For a Y motor, the sensed motion is interrupted for 4 msec by a CPU (IC7) and calculated. For X and Z motors, it is interrupted for 8 msec by a CPU (IC7) and calculated.
During CPU (IC7) interrupt, the current coordinates are recalculated from the counters on the IF-401 board as subroutines on the CPU-118 board.

(2-a): When the X and Y coordinates of an elevator block reach the bin and VTR into which the desired cassette is inserted, the "catch" position of the hand's finger plate is adjusted. The height in which the finger plate at that time is opened is cassette height + 6mm. The Z assembly decelerates at 20 mm before it catches a cassette.
The finger plate is closed when a cassette evenly contacts hand sensors A and B⁽¹¹⁾.
The CPU-118 board stops an H motor when the finger plate is closed completely.

(2-b): A Z motor rotates in reverse to return to the former position. However, the Z-direction position of the hand assembly that has a cassette varies depending on the bin and VTR or the clearance of protrusion sensors. The Z motor does not necessarily return to the origin point.

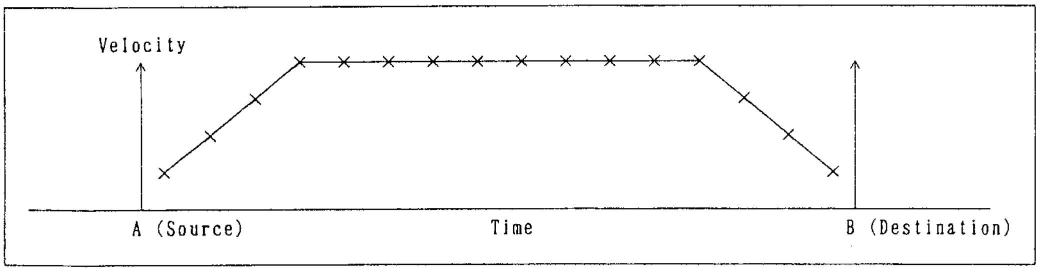


Fig. 2-2-13 Acceleration and Deceleration of X and Y Motor Servos (section 2-2-6. (3))

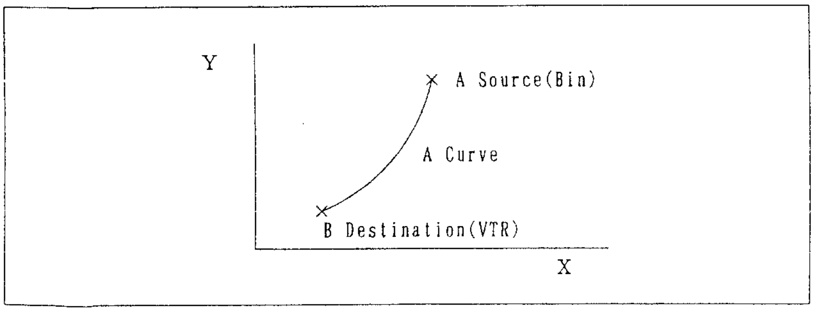


Fig. 2-2-14 X and Y Transfer Operations of Elevator (section 2-2-6. (3))

---

⁽¹⁰⁾ Macro information: Refer to the Flexicart Protocol and Command Specifications.

⁽¹¹⁾ Hand sensors A and B: Cassette A sensor and cassette B sensor. A indicates a right sensor, and B indicates a left sensor.

(3-a): An elevator is transported to the destination bin and VTR in the same process as in the first stage.

(4-a): The operation when a cassette is inserted into the VTR varies with BETACAM, D-2, and S-VHS formats. For only an S cassette, "forced block" operation is performed during insertion. The finger plate is larger opened than a tolerance of 6 mm, and a cassette is pushed into the VTR cassette compartment from the hand with a spatula.

(4-b): The Z insertion operation is continued without deceleration until a cassette is inserted into the bin and VTR by 20 mm. In this Z position, the finger plate is opened to "cassette height + 6 mm". After that, the Z push-out operation is continued to the precalculated position for every VTR or cassette type at low speed.

(4-c): A CPU (IC7) reads the sensor of a bin, confirms that a cassette is put in the correct position of the bin, and instructs the hand to return to the origin point. When hand sensors A and B are turned on, the CPU (IC7) identifies that the cassette does not exist in a hand.
During insertion of a cassette into the VTR, the hand returns to the origin point when the VTR takes in a cassette and when no cassette exists in the hand.

(4) Memory map on CPU-118 board

The memory map on the CPU-118 board is shown in Table 2-2-6.

| | After Reset | | After changed ROM Address |
|---|---|---|---|
| $FF:FFFF | | $FF:FFFF | |
| | Internal Register block | | Internal Register block |
| $FF:FC00 | | $FF:FC00 | |
| | Reserved | | Reserved |
| $F0:0000 | | $F0:0000 | |
| | External I/O (CPU-118) | | External I/O (CPU-118) |
| $E0:0000 | | $E0:0000 | |
| | Reserved | | Reserved |
| $C0:2000 | | $C0:2000 | |
| | External I/O (IF-401) | | External I/O (IF-401) |
| $C0:0000 | | $C0:0000 | |
| | Reserved | | Reserved |
| $D0:4000 | | $D0:4000 | |
| | Common RAM (CPU-107) | | Common RAM (CPU-107) |
| $D0:0000 | | $D0:0000 | |
| | Reserved | | Reserved |
| $B0:1000 | | $B0:1000 | |
| | Common RAM (RD-24) | | Common RAM (RD-24) |
| $B0:0000 | | $B0:0000 | |
| | Reserved | | Reserved |
| | | $28:0000 | |
| | | | Reserved |
| | | $24:0000 | |
| | | | ROM (2M bit) |
| | | $20:0000 | |
| | | | Reserved |
| | | $10:0000 | |
| $08:0000 | | | Reserved |
| | Reserved | | |
| $04:0000 | | $04:0000 | |
| | ROM (2M bit) | | Main RAM (2M bit) |
| $00:0000 | | $00:0000 | |

Table 2-2-6 Memory Map on the CPU-118 Board (section 2-2-6. (4))

## 2-2-7. IF-401 Board

The main purpose of the IF-401 board is to interface with the mechanical block and CPU-118 board. The IF-401 board converts the command from the CPU-118 board into a TTL[1] level, and sends it to the mechanical block, and sends the detection signal from the mechanical block to the CPU-118 board.
This board is connected to the CPU-118 or DR-187 board via the motherboard, and exchanges data or receives the power supply. The IF-401 board also counts the encoder pulse from X, Y, Z, and H motors.

(1) Outline of port communication

The IF-401 board has input and output ports so as to communicate with the following seven blocks. Fig. 2-2-15 shows the system diagram of communications with other blocks.

- CPU-118 board (CCC)
- DR-187 board (Motor/door lock plunger driver)
- Y block
- Elevator block
- Door lock block
- Protrusion sensor block
- Bin block

Table 2-2-7 shows the outline of each port communication.

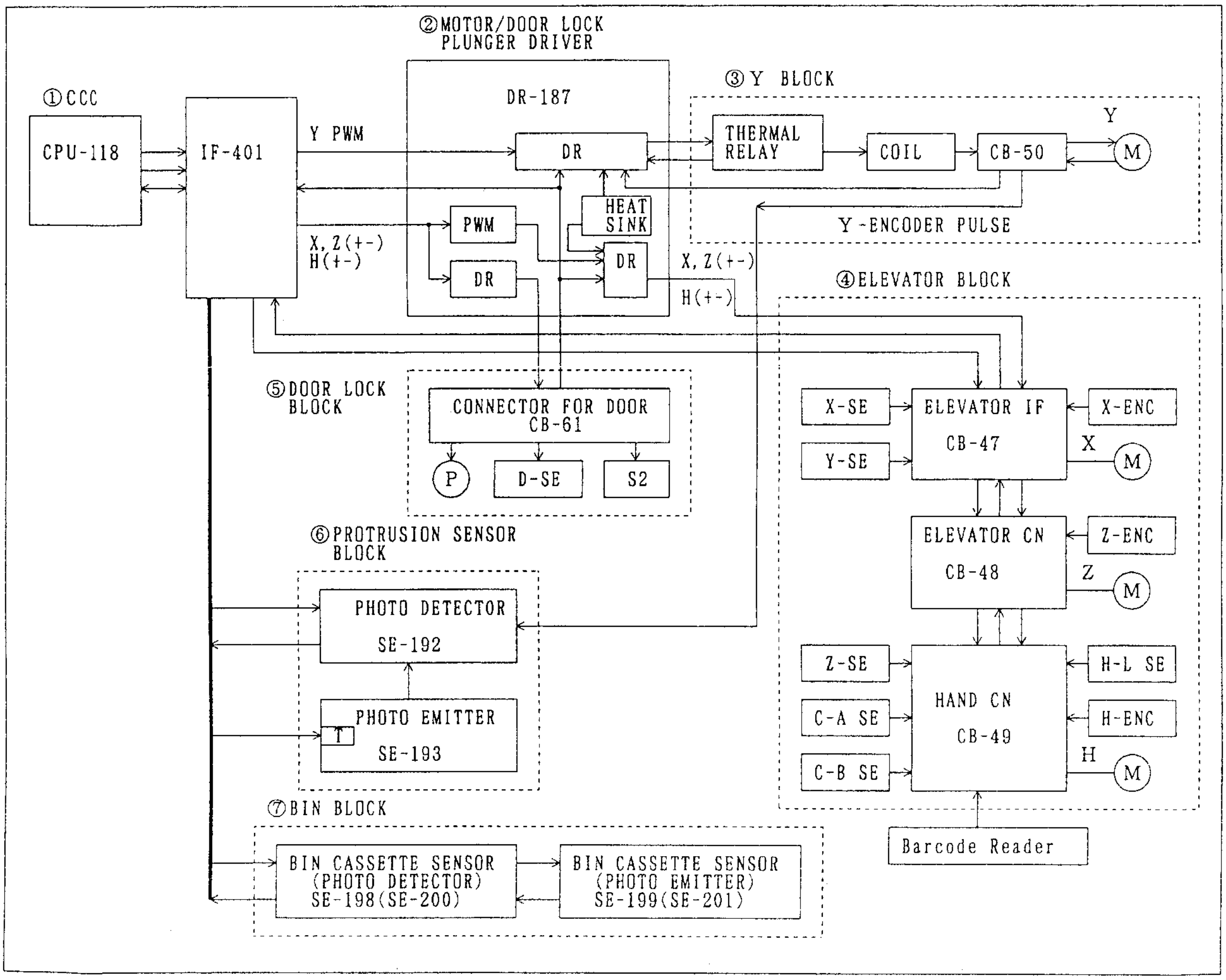

②MOTOR/DOOR LOCK PLUNGER DRIVER
①CCC
CPU-118
IF-401
DR-187
Y PWM
DR
PWM
HEAT SINK
DR
X, Z(+-) H(+-)
DR
③Y BLOCK
THERMAL RELAY
COIL
CB-50
Y
M
Y-ENCODER PULSE
X, Z(+-)
H(+-)
④ELEVATOR BLOCK
⑤DOOR LOCK BLOCK
CONNECTOR FOR DOOR CB-61
P
D-SE
S2
X-SE
Y-SE
ELEVATOR IF
CB-47
X-ENC
X
M
ELEVATOR CN
CB-48
Z-ENC
Z
M
⑥PROTRUSION SENSOR BLOCK
PHOTO DETECTOR
SE-192
PHOTO EMITTER
T
SE-193
Z-SE
C-A SE
C-B SE
HAND CN
CB-49
H-L SE
H-ENC
H
M
⑦BIN BLOCK
BIN CASSETTE SENSOR (PHOTO DETECTOR) SE-198(SE-200)
BIN CASSETTE SENSOR (PHOTO EMITTER) SE-199(SE-201)
Barcode Reader

Fig. 2-2-15 System Diagram of Communications on IF-401 Board (section 2-2-7. (1))

---

[1] TTL: Transistor Transisor Logic

| External block | IF-401 board Communications |
|---|---|
| ①Cassette Console Controller (CPU-118 board) | • Transceive data, status & commands<br>• Count Encoder pulse |
| ②Motor/Door Lock Plunger Driver (DR-187 board) | • Generate Y PWM[2] signal<br>• Sense Heat Sinck sensor status<br>• Issue Door Lock Plunger status<br>• Sense Thermal Relay sensor status |
| ③Y block | • Receive Y Motor Encoder pulse data |
| ④Elevator block | • Receive X, Z, H Motor Encoder pulse data<br>• Sense X, Z, H Origin sensor status<br>• Sense H Limit sensor status<br>• Sense Hand sensor(CAS-A, CAS-B) status |
| ⑤Door Lock block | • Sense Door Lock Open sensor status |
| ⑥Protrusion Sensor block | • Sense Protrusion sensor status |
| ⑦Bin block | • Sense Bin sensor status<br>• Control Bin sensors |

Table. 2-2-7 Communications of Input and Output Ports on IF-401 Board (section 2-2-7. (1))

In the communication with other blocks, the functions of the main input and output ports and IF-401 board are described next.

(2) Communication with CPU-118 board (Refer to Fig. 2-2-18.)

The bus buffers (IC40, IC41, IC42, and IC43) on the IF-401 board control the input signal from the CPU-118 board. IC40 is the transceiver of data buses (D0 to D7). IC41 is the receiver of high-order addresses (A7 to A12), and IC42 is the receiver of low-order addresses (A1 to A5). IC43 is the receiver of 8-MHz CLK, CPU RESET, IFSEL, and IR/$\overline{W}$ control lines.
IC45 receives the status of the mechanical block from the CB-47 and DR-187 boards and sends it to the CPU-118 board.
The communication with the IF-401 and CPU-118 boards are controlled in synchronization. IC22 and IC23 on this IF-401 board are used for the synchronization. For more information on IC22 and IC23, refer to section 2-2-6.
Since the IF-401 board inserted into the control block on the rear panel is away from X, Y, Z, and H encoders, an RS-422A driver IC is used to ensure the noise reduction and improved reliability in a transmission system.

(3) Communication with DR-187 board (Refer to Fig. 2-2-18.)

An output port (IC27) sends the bit indicating the rotation direction of a motor for X, Z, and H motor drivers to the DR-187 board and sends the status command indicating the switching state of a door lock plunger for a door lock plunger driver to the DR-187 board. IC28 determines the emergency conditions of the relay (RY1) on the DR-187 board that turns on and off the drive current of a Y motor by the Y motor cut-off software data from the CPU-118 board.
IC45 receives the status of the mechanical block such as a door lock open sensor (SE-222 board), elevator communication, heat sink sensor state, and thermal relay state from the DR-187 board and sends it to the CPU-118 board.

(4) Communication with Y block, and Y PWM generator (Refer to Figs. 2-2-16 and 2-2-17.)

A system clock of 8 MHz from the CPU-118 board is devided to 4 MHz by the divider (IC25 (1/3)) on the IF-401 board and sent to an eight-bit counter consisting of four-bit counters (IC29 and IC32) in the later stage. A PWM waveform of 64 µsec is generated using the eight-bit counter.
As shown in Fig. 2-2-16, IC25 (1/3), IC29, and IC32 determines the timing (A) at the beginning of a PWM waveform period.

---

[2] PWM: Pulse Width Modulation

The duty cycle of the PWM waveform is controlled by an eight-bit D-type flip-flop circuit (IC26: SN74HC273).
A Y servo is controlled by changing the duty cycle of the PWM waveform.

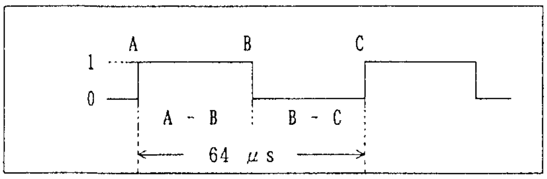


Fig. 2-2-16 PWM Waveform (section 2-2-7. (4))

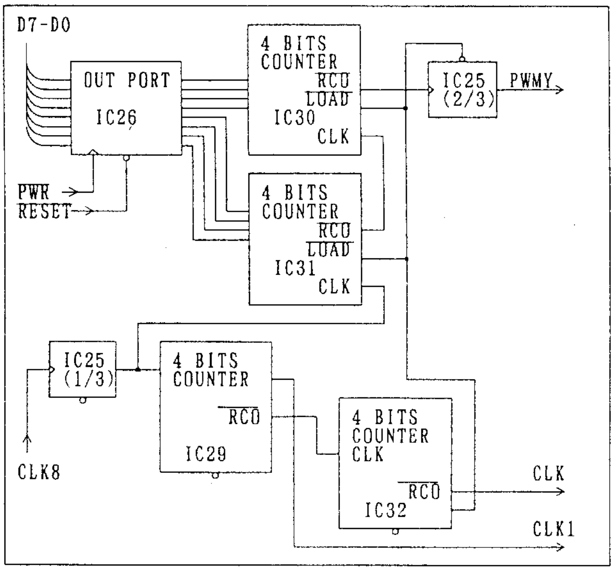

D7-D0
OUT PORT
IC26
PWR
RESET
4 BITS COUNTER
RCO
LOAD
IC30
CLK
4 BITS COUNTER
RCO
LOAD
IC31
CLK
IC25 (2/3)
PWMY
IC25 (1/3)
CLK8
4 BITS COUNTER
RCO
IC29
4 BITS COUNTER
CLK
RCO
IC32
CLK
CLK1

Fig. 2-2-17 Y PWM Generator (section 2-2-7. (4))

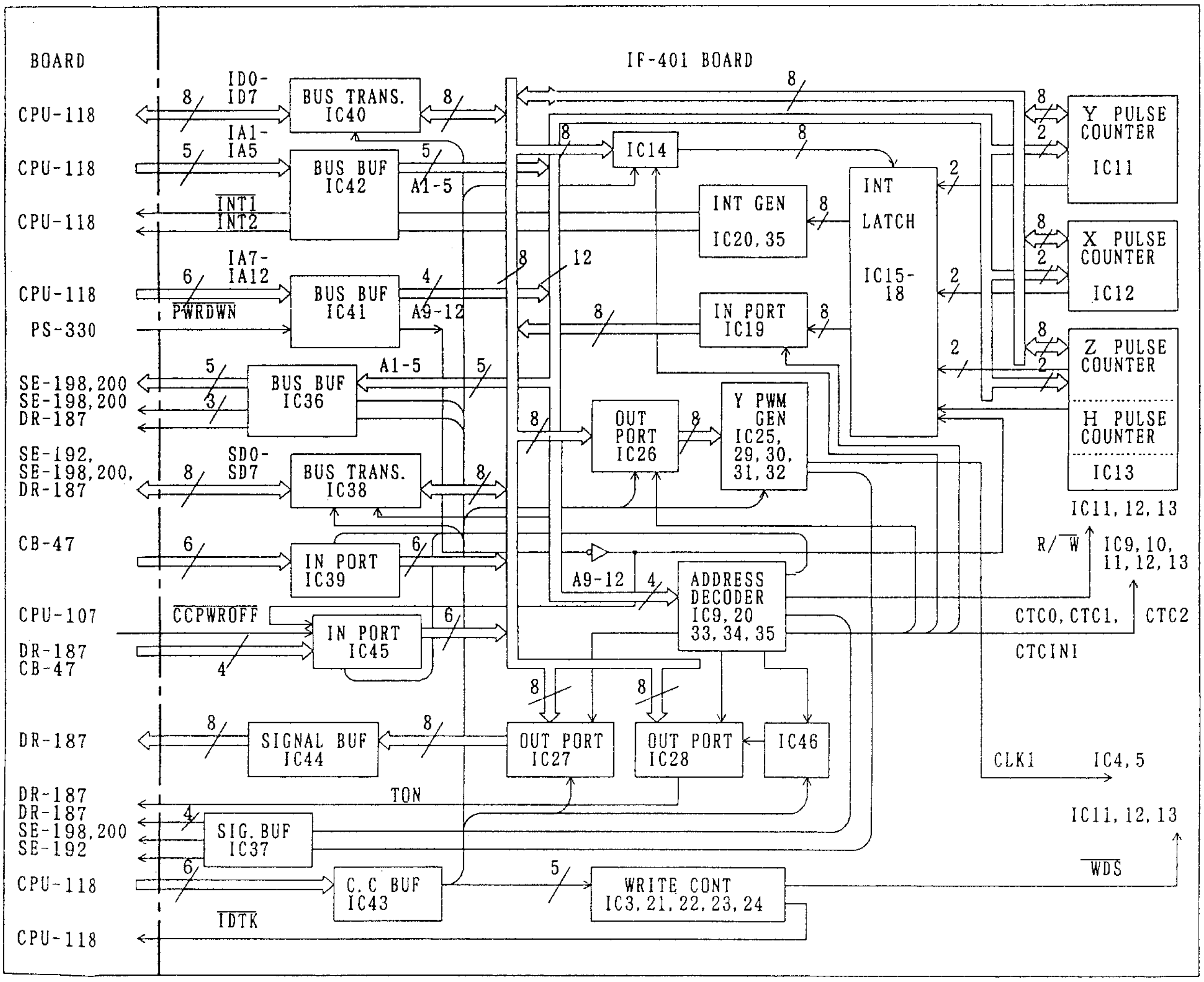

BOARD
IF-401 BOARD
CPU-118
CPU-118
CPU-118
CPU-118
PS-330
SE-198,200
SE-198,200
DR-187
SE-192,
SE-198,200,
DR-187
CB-47
CPU-107
DR-187
CB-47
DR-187
DR-187
DR-187
SE-198,200
SE-192
CPU-118
CPU-118
ID0-ID7
IA1-IA5
INT1
INT2
IA7-IA12
PWRDWN
SD0-SD7
CCPWROFF
TON
IDTK
BUS TRANS. IC40
BUS BUF IC42
A1-5
BUS BUF IC41
A9-12
BUS BUF IC36
A1-5
BUS TRANS. IC38
IN PORT IC39
IN PORT IC45
SIGNAL BUF IC44
SIG. BUF IC37
C.C BUF IC43
IC14
INT GEN IC20, 35
IN PORT IC19
INT LATCH IC15-18
OUT PORT IC26
Y PWM GEN IC25, 29, 30, 31, 32
ADDRESS DECODER IC9, 20 33, 34, 35
A9-12
OUT PORT IC27
OUT PORT IC28
IC46
WRITE CONT IC3, 21, 22, 23, 24
Y PULSE COUNTER IC11
X PULSE COUNTER IC12
Z PULSE COUNTER
H PULSE COUNTER
IC13
IC11, 12, 13
R/W
IC9, 10, 11, 12, 13
CTC0, CTC1,
CTC2
CTCINI
CLK1
IC4, 5
IC11, 12, 13
WDS
8
5
6
8
6
4
8
5
3
12
2
4

Fig. 2-2-18 IF-401 Board Block (Input and Output Ports and Their Peripheral Circuit Block on CPU-118 and DR-187 Boards) (section 2-2-7. (2) to (7))

| | Y transfer | Motor current |
|---|---|---|
| • Duty Cycle <50%: | Up | Forward direction (+) |
| • Duty Cycle >50%: | Down | Reverse direction (–) |
| • Duty Cycle =50%: | Stop | No flow |

○ Counting of encoder pulse from Y, X, Z, and H motors (Refer to Figs. 2-2-18 and 2-2-21.)

X, Y, Z, and H motors are controlled on the CPU-118 board by the four components of each coordinate shown in Table 2-2-8.

| Assembly | Axis | Component(*) |
|---|---|---|
| ①Elevator | X | 2 CH, +/− |
| ②Transfer | Y | 2 CH, +/− |
| ③Hand | Z | 2 CH, +/− |
| ④Finger Plates | H | 1 CH, +/− |
| (*) • 2 CH : A/ B Direction Channel | | |
| • +/− : Positive/Negative Current | | |

Table. 2-2-8 Components of Each Coordinate (section 2-2-7. (4))

Fig. 2-2-20 shows the movement of each component at X, Y, Z, and H axes. Each component is the same in X, Y, Z, H axes. However, only cassette finger plates (H) communicate in one channel.
The movement of these components is sensed by an encoder pulse of each motor, counted by the IF-401 board, sent to the CPU-118 board, then controlled. The counting by the IF-401 board is described next. Since the counting at each coordinate is the same, only X-coordinates are explained. In the encoder of an X motor, pulses A CH and B CH with a phase difference of 90 degrees are generated and input to the IF-401 board via an RS-422A line. (Refer to Fig. 2-2-19.)

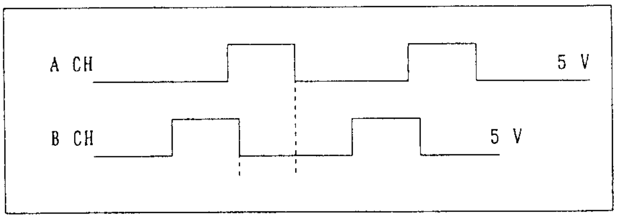

A CH
5 V
B CH
5 V

Fig. 2-2-19 Encoder Pulse Output (section 2-2-7. (4))

Pulses A CH and B CH are direction components shown in Fig. 2-2-20. They are sent to a pulse decoder (IC5: CX23028) and compared to sense the direction. These pulses are then input to a 16-bit pulse counter (IC12: CXQ71054P), where the rotations in the +/– direction of a motor are counted. The X position is given by the following expression.

(Counter value in the + direction) – (Counter value in the – direction)

In such a way, IC12 counts the X position and movement. When the number of counts increases and the counter overflows, the counter value is input to the D-type flip-flop circuit (IC15 to IC18) in the next stage so as to interrupt the CPU-118 board by a port (IC19). On the CPU-118 board, necessary data such as direction and position is calculated according to the data. Y-coordinate data has higher interrupt priority over X- and Z-coordinate data.
In the H mode, finger plates only catch or release a cassette. Therefore, the channel component of encoder data is only one. Data is thus input directly to a dual pulse counter (IC13) without passing through a pulse decoder.

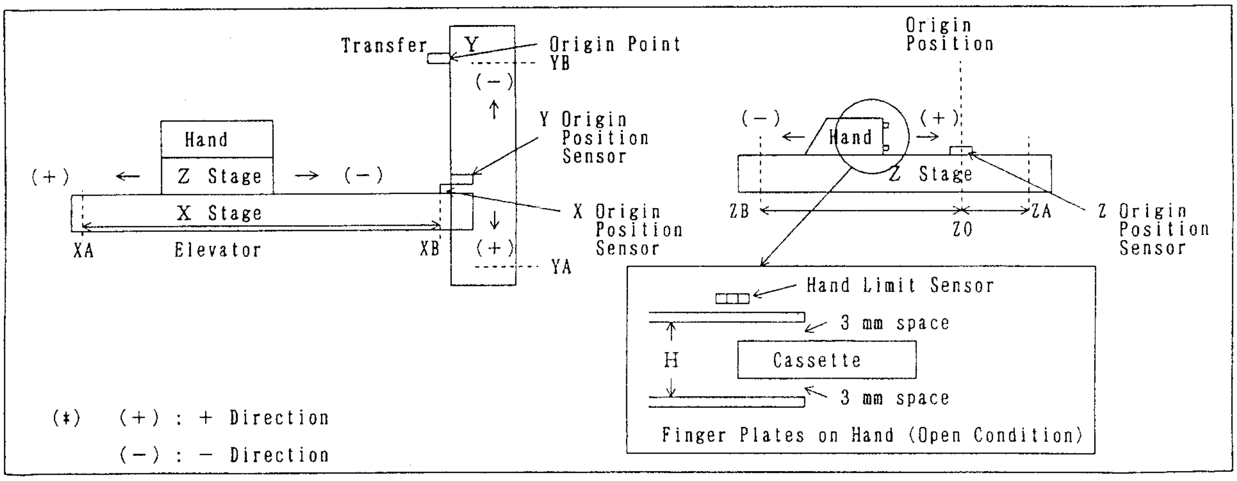

Transfer
Y
Origin Point
YB
(−)
Y Origin Position Sensor
Hand
Z Stage
(+)
(−)
X Stage
XA
Elevator
XB
(+)
YA
X Origin Position Sensor
Origin Position
(−)
(+)
Hand
Z Stage
ZB
ZO
ZA
Z Origin Position Sensor
Hand Limit Sensor
3 mm space
H
Cassette
3 mm space
Finger Plates on Hand (Open Condition)
(*) (+) : + Direction
(−) : − Direction

Fig. 2-2-20 Movement of X, Y, Z, and H Motors (section 2-2-7. (4))

(5) Communication with elevator block (Refer to Fig. 2-2-18.)

For the communication with an elevator block, an input port (IC39) receives the following sensor status from the CB-47 board of the elevator block and outputs sensor data to the data bus as required, in addition to step (4) on the preceding page.

- Bin initial sensor data (BINI)
- H limit sensor data (HLIMIT)
- Cassette B sensor data (CASB)
- Cassette A sensor data (CASA)
- Z-origin position sensor data (ZORG)
- X-origin position sensor data (XORG)

(6) Communication with protrusion sensor block (Refer to Figs. 2-2-18 and 2-2-21.)

Protrusion sensor detection data and Y motor encoder data are received from the SE-192 board of the protrusion sensor block. The Y motor encoder data contains component data (i.e. A, B, +, and –). These data items are input to a dual pulse decoder (IC4) to sense the data direction. They are then input to a Y pulse counter (IC11) to count a pulse. A protrusion sensor select control signal ($\overline{\text{PRTSEL}}$) is output from a buffer (IC37) to the SE-192 board.

(7) Communication with bin block (Refer to Fig. 2-2-18.)

IC36 is an address bus buffer for the photo detector (SE-198 and SE-200) board of a bin cassette sensor. IC38 is the transceiver of a data bus. A buffer (IC37) outputs a write/read select control signal ($\overline{\text{SBIN}}$) to the photo detector (SE-198 and SE-200) board.

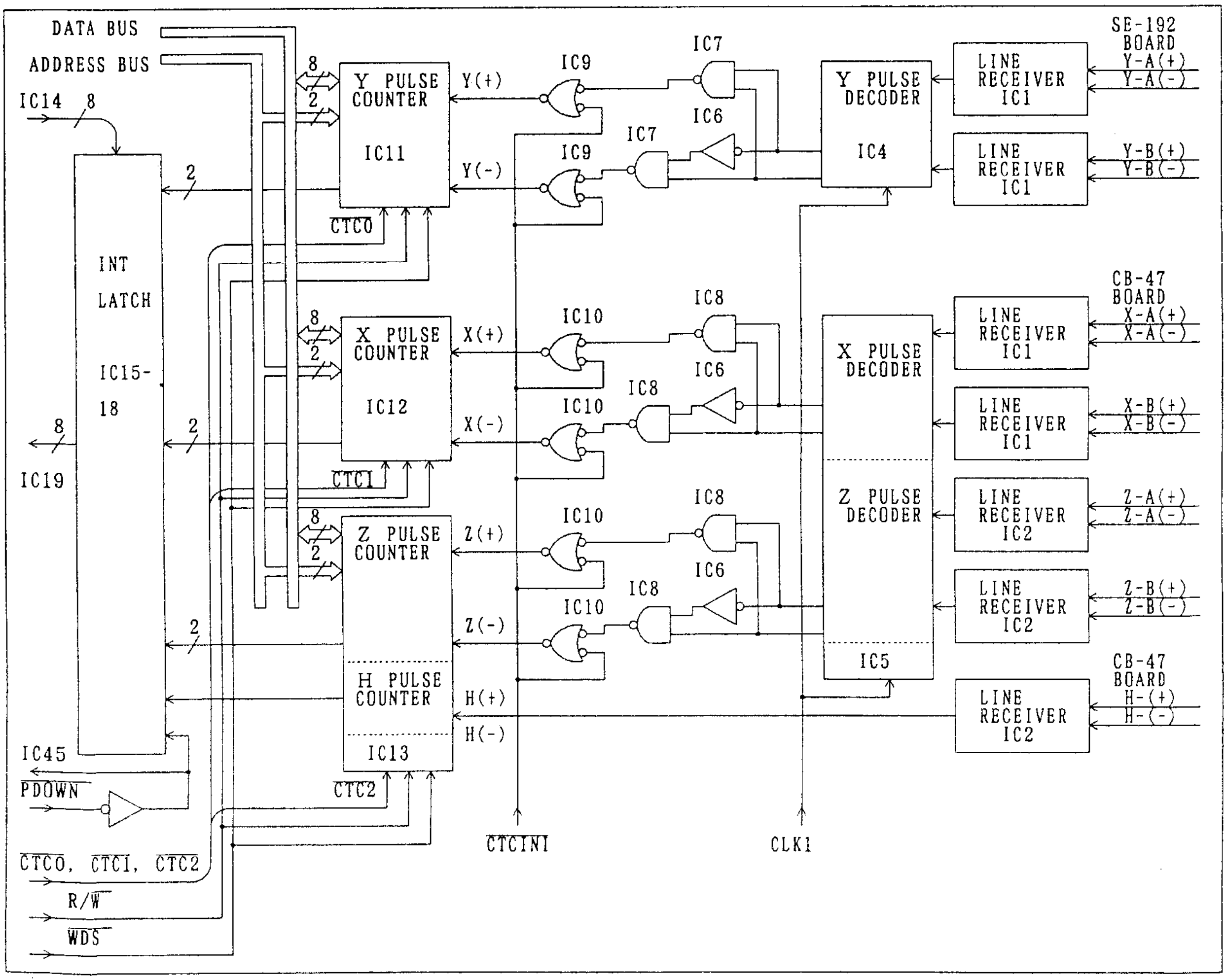

DATA BUS
ADDRESS BUS
IC14
8
INT
LATCH
IC15-
18
8
IC19
2
2
2
IC45
PDOWN
CTC0, CTC1, CTC2
R/W
WDS
8
2
Y PULSE
COUNTER
IC11
CTC0
8
2
X PULSE
COUNTER
IC12
CTC1
8
2
Z PULSE
COUNTER
H PULSE
COUNTER
IC13
CTC2
Y(+)
Y(-)
X(+)
X(-)
Z(+)
Z(-)
H(+)
H(-)
IC9
IC9
IC7
IC7
IC6
IC10
IC10
IC10
IC10
IC8
IC8
IC8
IC8
IC6
IC6
CTCINI
CLK1
Y PULSE
DECODER
IC4
X PULSE
DECODER
Z PULSE
DECODER
IC5
LINE
RECEIVER
IC1
LINE
RECEIVER
IC2
SE-192
BOARD
Y-A(+)
Y-A(-)
Y-B(+)
Y-B(-)
CB-47
BOARD
X-A(+)
X-A(-)
X-B(+)
X-B(-)
Z-A(+)
Z-A(-)
Z-B(+)
Z-B(-)
CB-47
BOARD
H-(+)
H-(-)

Fig. 2-2-21 Y, X, Z, and H Pulse Counter Circuit (section 2-2-7. (4) and (6))

## 2-2-8. DR-187 Board

The DR-187 board drives the four motors at Y, X, Z, and H coordinates and controls the door lock block. This board primarily consists of the following seven blocks. (Refer to Fig. 2-2-22.)

- Y motor driver block (Driver for Y block)
- PWM for X, Z block (Pulse Width Modulator for X, Z block)
- X motor driver block (Driver for elevator X-axis block)
- Z motor driver block (Driver for elevator Z-axis block)
- Driver for door lock plunger block
- H motor driver block (Driver for elevator Hand-axis block)
- LED driver block

(1) Y motor driver block (Refer to Fig. 2-2-23.)

The PWMY signal generated by a Y PWM generator on the IF-401 board is sent through a buffer (IC37) on the IF-401 board to the buffers (IC20 (1/10) and IC33 (2/7)) on the DR-187 board. After that, a signal that is out of phase with the PWMY signal is sent through an AND circuits (IC22 (1/5) and IC22 (4/5)) to a photocoupler (PC1 and PC4) for noise suppression. A signal that is in phase with the PWMY signal is input through a inverter circuit (IC21 (3/7)) to an AND circuits (IC22 (2/5) and IC22 (3/5)) and sent to a photocoupler (PC2 and PC3). In the four AND circuits, a heat sink, thermal relay, servo turn on (TON), and door lock open sensor (DPEN11) are ANDed with the ANDed signal. These AND circuits are use to stop a Y motor when the door is opened or when an overheat occurs.

The output signal of the photocoupler is input to a switching circuit consisting of an FET (Q40 to Q47). In the switching circuit, a motor power of +24 V is switched using a PWM input signal to drive a Y motor. When the PWM output signal is positive (+), Q40 and Q41, and Q44 and Q45 are turned on. The Y motor then rotates in the forward direction. When it is negative (–), Q42 and Q43, and Q46 and Q47 are turned on. The Y motor then rotates in reverse.

The principle of the driver circuit and motor operation is shown in Fig. 2-2-24.

The Y motor driver block has electromagnetic relays (RY1 and RY2) that operate with a door lock block.

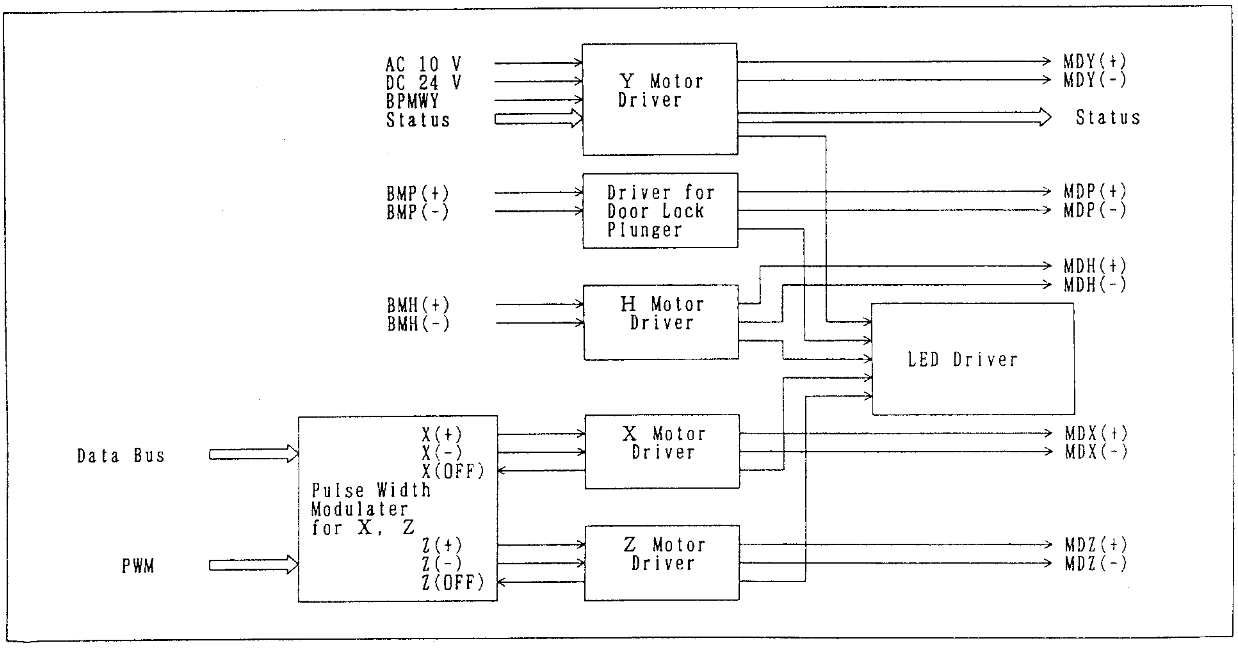

AC 10 V
DC 24 V
BPMWY
Status
Y Motor Driver
MDY(+)
MDY(-)
Status
BMP(+)
BMP(-)
Driver for Door Lock Plunger
MDP(+)
MDP(-)
MDH(+)
MDH(-)
BMH(+)
BMH(-)
H Motor Driver
LED Driver
Data Bus
PWM
X(+)
X(-)
X(OFF)
Pulse Width Modulater for X, Z
Z(+)
Z(-)
Z(OFF)
X Motor Driver
MDX(+)
MDX(-)
Z Motor Driver
MDZ(+)
MDZ(-)

Fig. 2-2-22 DR-187 Board Block (section 2-2-8.)

RY1 and RY2 are turned on when this cart machine operates normally. The RY1 terminals (3 and 6) are then connected to terminals (4 and 5), and the Y motor operates as described above. RY1 and RY2 are turned off when the power supply stops due to a power failure or when the door is opened. The RY1 terminals (3 and 6) is then connected to terminals (2 and 7), both ends of the Y motor are shorted, and the Y motor stops.
The switched +24 V motor power is sent through a thermal relay and choke coil to the Y motor.

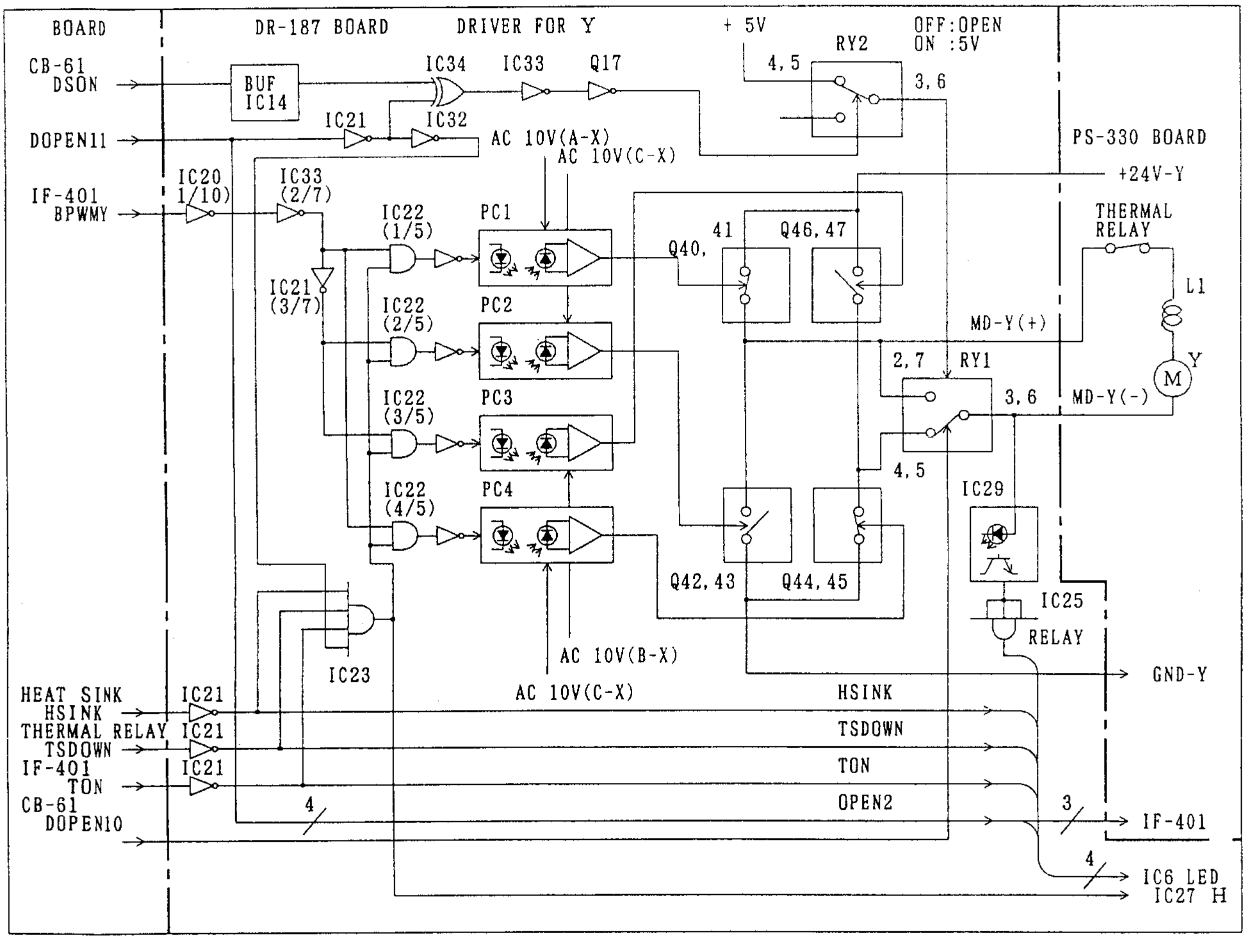

BOARD
DR-187 BOARD
DRIVER FOR Y
+ 5V
OFF:OPEN
ON :5V
RY2
CB-61
DSON
BUF
IC14
IC34
IC33
Q17
4, 5
3, 6
DOPEN11
IC21
IC32
AC 10V(A-X)
AC 10V(C-X)
PS-330 BOARD
IF-401
BPWMY
IC20
1/10)
IC33
(2/7)
+24V-Y
IC22
(1/5)
PC1
41
Q46, 47
THERMAL
RELAY
Q40,
IC21
(3/7)
IC22
(2/5)
PC2
L1
MD-Y(+)
2, 7
RY1
Y
M
IC22
(3/5)
PC3
3, 6
MD-Y(-)
4, 5
IC22
(4/5)
PC4
IC29
Q42, 43
Q44, 45
IC25
RELAY
AC 10V(B-X)
IC23
GND-Y
HEAT SINK
HSINK
IC21
AC 10V(C-X)
HSINK
THERMAL RELAY
TSDOWN
IC21
TSDOWN
IF-401
TON
IC21
TON
CB-61
DOPEN10
4
OPEN2
3
IF-401
4
IC6 LED
IC27 H

Fig. 2-2-23 Y Motor Driver Block (section 2-2-8.(1))

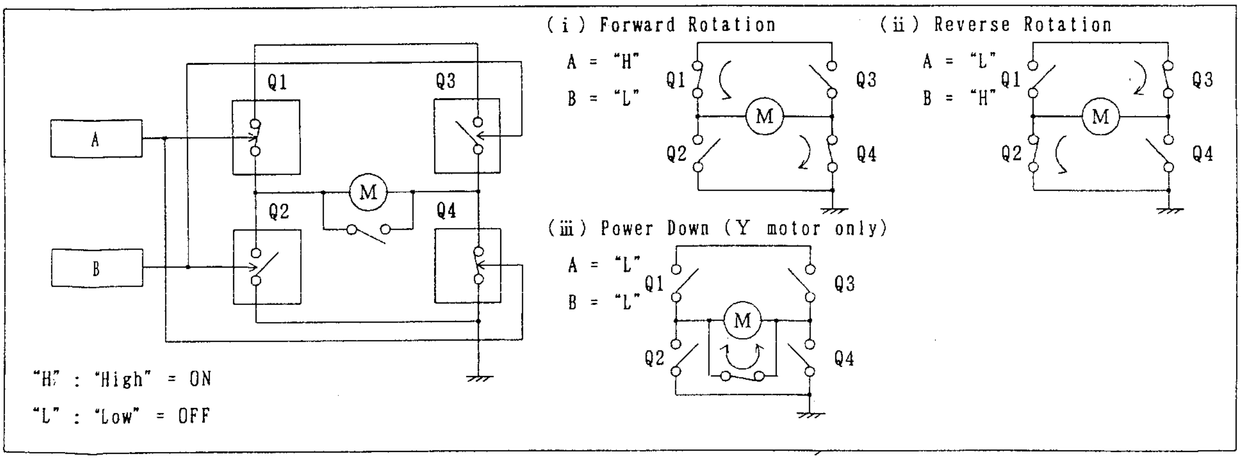

A
B
Q1
Q3
M
Q2
Q4
"H" : "High" = ON
"L" : "Low" = OFF
( i ) Forward Rotation
A = "H"
B = "L"
Q1
Q3
M
Q2
Q4
( ii ) Reverse Rotation
A = "L"
B = "H"
Q1
Q3
M
Q2
Q4
( iii ) Power Down (Y motor only)
A = "L"
B = "L"
Q1
Q3
M
Q2
Q4

Fig. 2-2-24 Principle of Driver Circuit and Motor Operation (section 2-2-8.(1))

(2) PWM for X, Z block (Refer to Fig. 2-2-25.)

The PWM for X, Z block generates X and Z PWM waves according to the set speed by the BMX(1+), BMX(–), BMZ(+), and BMZ(–) data from the IF-401 board.

The eight-bit data (SD7 to SD0) that determines the duty cycle of the PWM waveform from the IF-401 board is input to a bus driver (IC18). The eight-bit data for a X motor is sent to a latch circuit (IC11), and the data for a Z motor is sent to a latch circuit (IC17). In the latch circuit (IC11), the eight-bit data is latched using control signals ($\overline{\text{XPWM}}$ and $\overline{\text{SRESET}}$). In the latch circuit (IC17), the eight-bit data is latched using control signals ($\overline{\text{ZPWM}}$ and $\overline{\text{SRESET}}$). The latched data is converted into serial using a counter (IC9, IC10, IC15, and IC16), shaped using a flip-flop circuit (IC8), and output to IC35 and IC19. In IC35 and IC19, the PWM wave is generated.

The generated PWM wave is output as X(+), X(–), Z(+), and Z(–). In IC35 and IC19, moreover, the output signal is turned off to stop X and Z motors by the stop instruction from IC23 in the Y motor driver block on the DR-187 board or by the X(OFF) and Z(OFF) emergency instruction due to the overcurrent of X and Z motors.

(3) Driver for Door lock plunger block (Refer to Fig. 2-2-26.)

The door lock plunger control signals (BMP(+) and BMP(–)) generated on the IF-401 board are input to buffers (IC20 (7/10) and IC20 (8/10)). The signals are then input to AND circuits (IC25 (2/4) and IC25 (3/4)), where they are ANDed with an overcurrent detection signal.

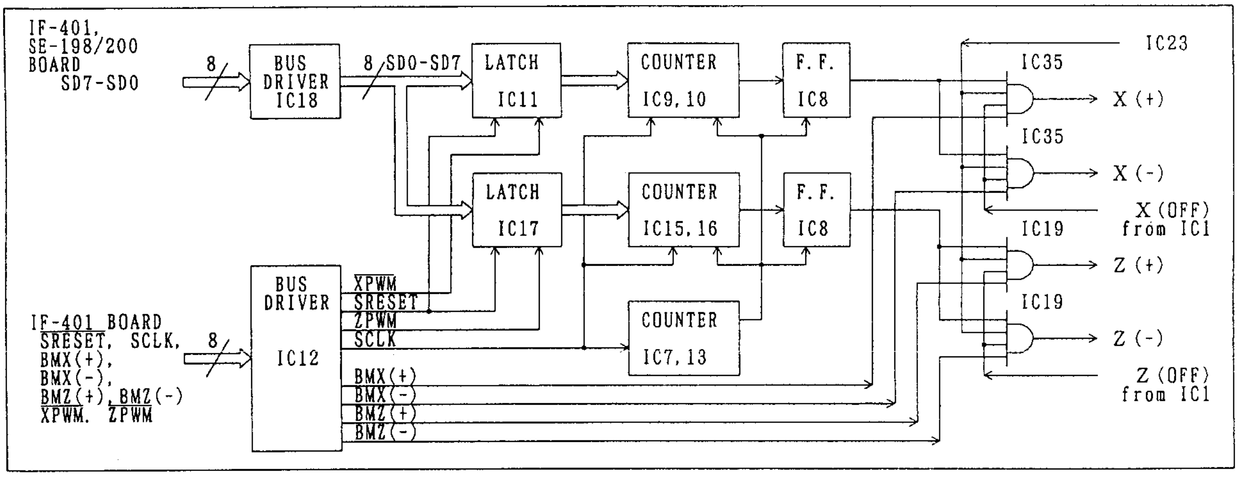

IF-401,
SE-198/200
BOARD
SD7-SD0
8
BUS DRIVER IC18
8 SD0-SD7
LATCH IC11
COUNTER IC9, 10
F.F. IC8
IC23
IC35
X (+)
IC35
X (-)
LATCH IC17
COUNTER IC15, 16
F.F. IC8
X (OFF) from IC1
IC19
Z (+)
IC19
Z (-)
Z (OFF) from IC1
BUS DRIVER IC12
XPWM
SRESET
ZPWM
SCLK
COUNTER IC7, 13
IF-401 BOARD
SRESET, SCLK,
BMX(+),
BMX(-),
BMZ(+), BMZ(-)
XPWM, ZPWM
8
BMX(+)
BMX(-)
BMZ(+)
BMZ(-)

Fig. 2-2-25 PWM for X, Z Block (section 2-2-8.(2))

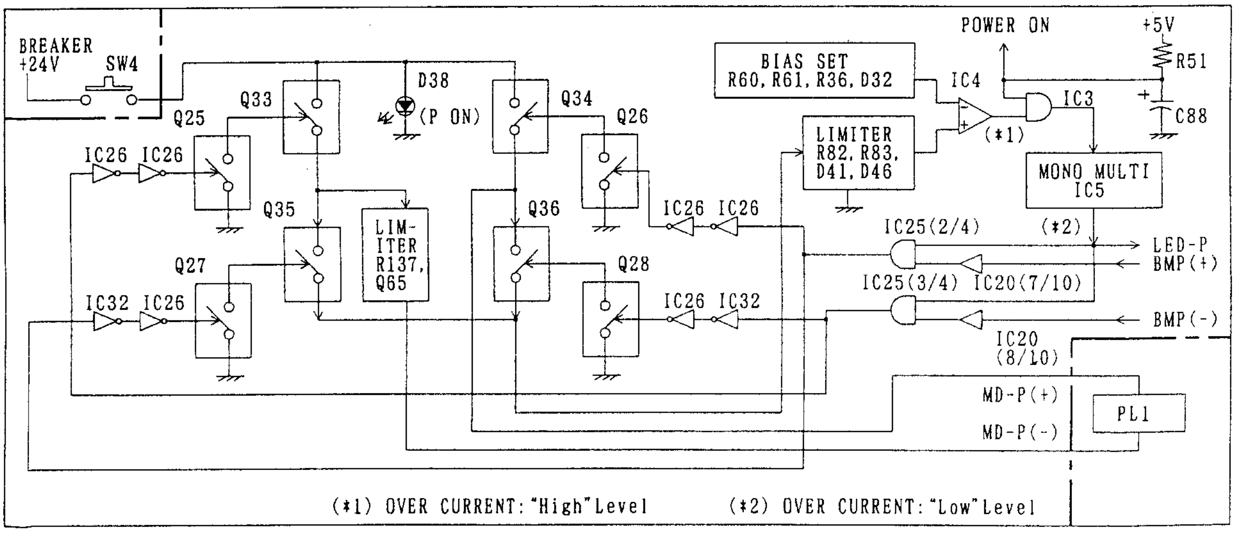

BREAKER
+24V
SW4
Q25
Q33
D38
(P ON)
Q34
Q26
BIAS SET
R60, R61, R36, D32
IC4
POWER ON
IC3
+5V
R51
C88
(*1)
LIMITER
R82, R83,
D41, D46
MONO MULTI
IC5
IC26 IC26
Q35
LIM-
ITER
R137,
Q65
Q36
IC26 IC26
IC25(2/4)
(*2)
LED-P
BMP(+)
Q27
Q28
IC25(3/4)
IC20(7/10)
IC32 IC26
IC26 IC32
BMP(-)
IC20
(8/10)
MD-P(+)
MD-P(-)
PL1
(*1) OVER CURRENT: "High" Level
(*2) OVER CURRENT: "Low" Level

Fig. 2-2-26 Driver for Door lock plunger Block (section 2-2-8.(3))

The ANDed signal branches into two paths and sent to IC26 and IC32. When a "H"[1] signal is input to the BMP(+) pin, Q26 and Q34, and Q27 and Q35 are turned on. As a result, a power of +24 V flowing in a network via a breaker (SW4) is sent through Q34 to the MD-P(+) pin of a plunger (PL1) to lock the door. The current is then passed through Q35 and a limiter and flows in ground (GND).

The plunger (PL1) is a self-holding type so that the door is securely locked even if no power is supplied. Therefore, to release the door, a reverse current must flow in the plunger (PL1). When a BMP(-) signal is set "H" and input, Q25 and Q33, and Q28 and Q36 are turned on. The +24 V power is then sent through Q33 to the MD-P(-) pin of a plunger (PL1), and a reverse current flows in the plunger (PL1) to release the door.

The voltage occurring at both ends of R82 and R83 in a limiter circuit is sent to a comparator (IC4) and compared with the voltage set by a bias set circuit. When an overcurrent exceeding the set voltage is generated, it is input through IC3 to a monostable multivibrator (IC5). The output signal of IC5 is sent to IC25 so that a driver circuit is not activated. This state is held until a POWER ON signal is input again. The output signal of IC5 is also sent to an LED driver (IC6) as an LED-P signal so as to turn on the LED (red)(D7) on the DR-187 board and generate an alarm.

The LED (green)(D38) on the DR-187 board lights while a power of +24 V is supplied to this circuit.

(4) H motor driver block (Refer to Fig. 2-2-27.)

The H motor driver block is almost the same in circuit configuration as the driver for door lock plunger block. The H motor drive control signals (BMH(+) and BMH(-)) generated on the IF-401 board are input to buffers (IC20 (5/10) and IC20 (6/10)). The signals are then input to AND circuits (IC27 (1/4) and IC27 (2/4)), where these signals are ANDed with an overcurrent detection signal.

The ANDed signal branches into two paths is sent to IC24. When a "H" signal is input to the BMH(+) pin, Q13 and Q5, and Q16 and Q8 are turned on. As a result, a power of +24 V flowing in a network via a breaker (SW2) is sent through Q5 to the MD-H(+) pin of an H motor (M4) to drive the H motor (M4). The current is then passed through Q8 and a limiter and flows in ground (GND).

When a "H" signal is input to the BMH(-) pin, Q14 and Q6, and Q15 and Q7 are turned on. The 24 V power is sent through Q6 to the MD-H(-) pin of an H motor (M4). Therefore, a reverse current flows in the H motor. The H motor then rotates in reverse.

A limiter circuit that is provided to prevent an overcurrent detects the overcurrent by using the voltage occurring at both ends of R3 and R4. The operation is the same as in the driver for door lock plunger block described above. An output signal is turned off by IC27 when an overcurrent flows. A POWER ON signal is supplied from R51 and C88 of the driver for door lock plunger block. The output signal of IC5 is also sent to an LED driver (IC6) as an LED-H signal to turn on the LED (red)(D6) on the DR-187 board and generate an alarm. The output signal of IC27 is also turned off by the stop instruction from IC23 in the Y motor driver block on the DR-187 board. The LED (green)(D29) on the DR-187 board lights while a power of +24 V is supplied to the H motor driver block.

(5) X motor driver block (Refer to Fig. 2-2-29.)

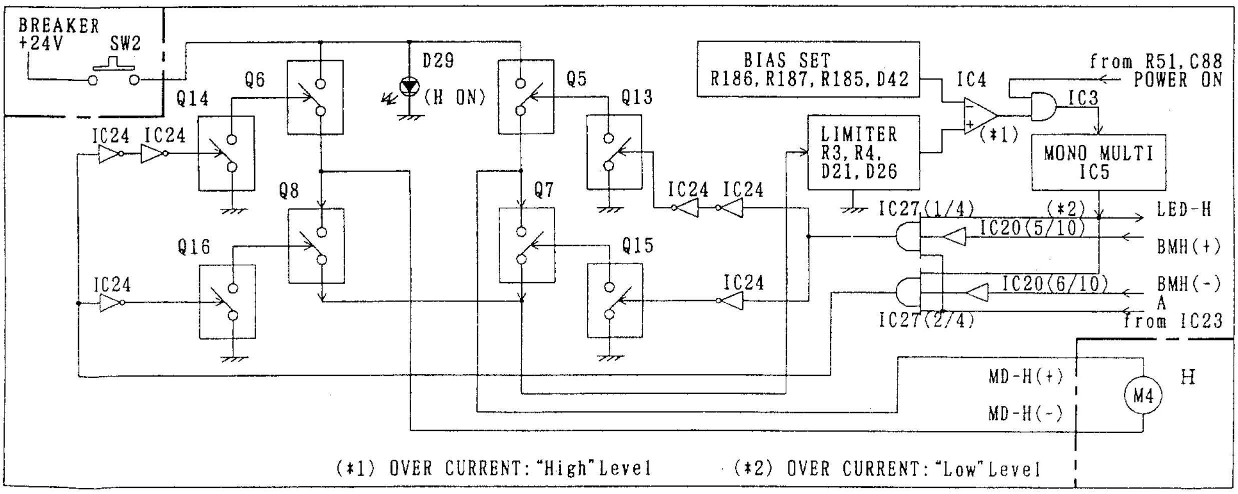


Fig. 2-2-27 H Motor Driver Block (section 2-2-8. (4))

---

[1] "H": "High" level

The X motor driver PWM waves (X(+) and X(–)) generated by the PWM for X, Z block are input to IC30 (4/7) and IC30 (6/7) in this X motor driver block.
When a "H" signal is input to the X(+) pin, it is inverted by IC30 (4/7) and Q10 and Q2 are turned off. Q12 and Q4 are turned on because they have the same input signal X(+) polarity. Since a "L"[2] signal is input to the X(-) pin at that time, Q9 and Q1 are turned on, but Q11 and Q3 are turned off. As a result, a power of +24 V flowing in a network via a breaker (SW1) is sent through Q1 to the MD-X(+) pin of an X motor (M2) to drive the X motor. The current is then passed through Q4 and a limiter and flows in ground (GND).
When a "H" signal is input to the X(–) pin, a power of +24 V is sent through Q2 to the MD-X(–) pin of an X motor (M2). The X motor thus rotates in reverse.
An overcurrent is detected by using the voltage occurring at both ends of R1 and R2 in a limiter circuit. A POWER ON signal is supplied from R51 and C88 in the driver for door lock plunger block. An overcurrent signal (X(OFF)) is output from a monostable multivibrator (IC1) when an overcurrent occurs. The overcurrent signal is sent to IC35 in the PWM for X, Z block to stop the motor. The signal is also sent to an LED driver (IC6) as an LED-X signal so as to turn on the LED (red)(D4) on the DR-187 board and generate an alarm.
The LED (green)(D18) on the DR-187 board lights while a power of +24 V is sent to the X motor driver block.

(6) Z motor driver block

The Z motor driver block is the same in circuit configuration as an X motor driver block.

(7) LED driver block (Refer to Fig. 2-2-28.)

The LED driver block displays the alarm status for the DR-187 board. This circuit consists of an LED driver (IC6) and LEDs (red)(D1 to D7, and D79). Each LED indicates the following statuses when it lights. For more details, refer to section 4-10-2.

- RELAY (D79) : Electromagnetic relay (RY1) OFF for Y motor
- LED-P (D7) : Door lock plunger overcurrent detected
- LED-X (D4) : X motor overcurrent detected
- LED-Z (D5) : Z motor overcurrent detected
- LED-H (D6) : H motor overcurrent detected
- HSINK (D1) : Heat sink sensor error
- TSDOWN (D2) : Thermal relay error
- TON (D3) : Motor servo OFF on IF-401 board

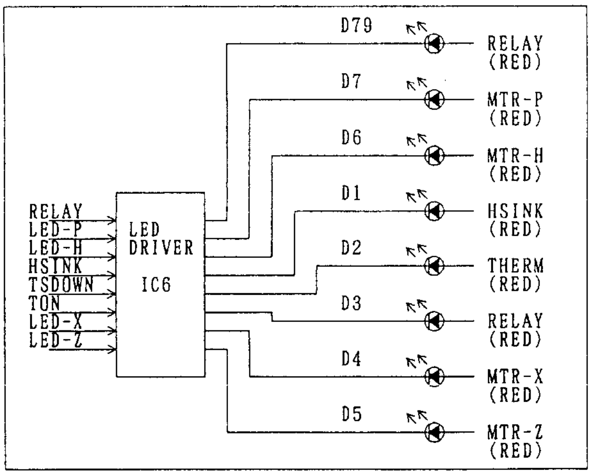

D79
RELAY (RED)
D7
MTR-P (RED)
D6
MTR-H (RED)
D1
HSINK (RED)
D2
THERM (RED)
D3
RELAY (RED)
D4
MTR-X (RED)
D5
MTR-Z (RED)
RELAY
LED-P
LED-H
HSINK
TSDOWN
TON
LED-X
LED-Z
LED DRIVER IC6

Fig. 2-2-28 LED Driver Block (section 2-2-8. (7))

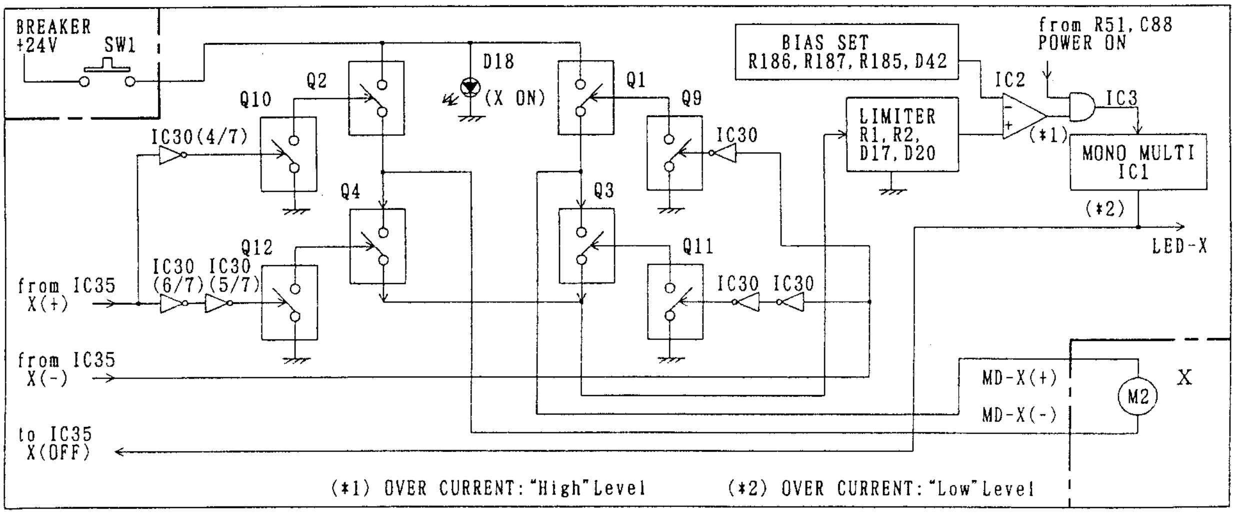

BREAKER
+24V
SW1
Q2
Q10
IC30(4/7)
D18
(X ON)
Q1
Q9
IC30
BIAS SET
R186, R187, R185, D42
IC2
from R51, C88
POWER ON
IC3
LIMITER
R1, R2,
D17, D20
(*1)
MONO MULTI
IC1
(*2)
LED-X
Q4
Q3
Q12
Q11
IC30 IC30
(6/7)(5/7)
IC30 IC30
from IC35
X(+)
from IC35
X(-)
to IC35
X(OFF)
MD-X(+)
MD-X(-)
M2
X
(*1) OVER CURRENT:"High"Level
(*2) OVER CURRENT:"Low"Level

Fig. 2-2-29 X Motor Driver Block (section 2-2-8. (5))

---

[2] "L": "Low" level

## 2-2-9. Door Lock Block

The door lock block is the switching device of a front door. It is installed inside the left side panel of this cart machine.
The door lock block consists of the sensors and door lock plunger for door switching and the connection board (CB-61 board) with the DR-187 board that controls the sensors and door lock plunger.
A door lock open sensor (SE-222) board and door open sensor (S2) are available as the sensor.
The door lock open sensor (SE-222) board senses the door switching by a photocoupler (IC1). The door open sensor (S2) senses the door switching by a microswitch. When the door opens, the two sensors sense the operation and stops the motor rotation.
For the control of the sensors and door lock plunger, refer to the DR-187 board in section 2-2-8.

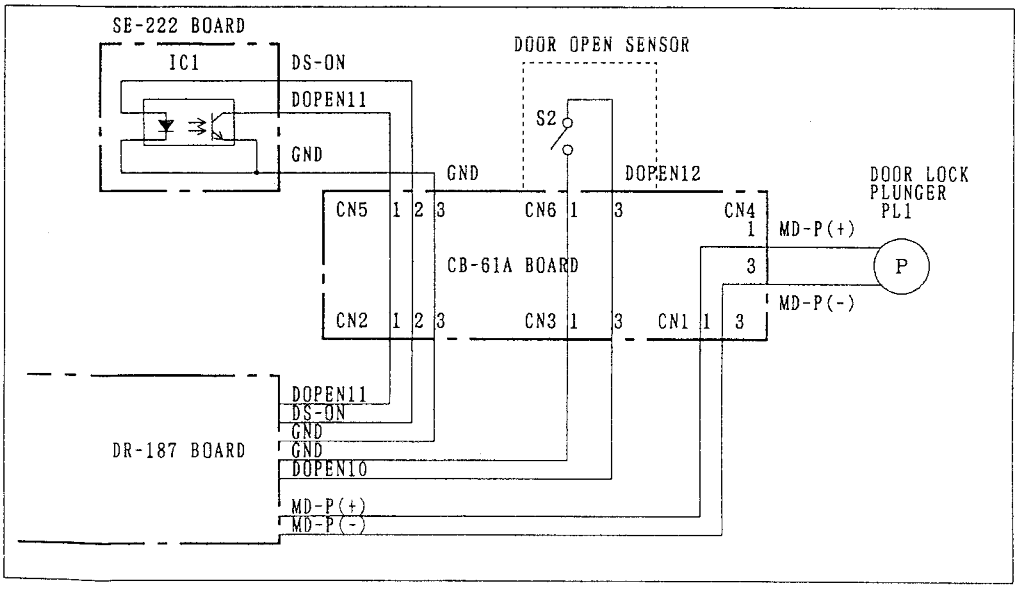

SE-222 BOARD
IC1
DS-ON
DOPEN11
GND
DOOR OPEN SENSOR
S2
GND
DOPEN12
DOOR LOCK PLUNGER PL1
CN5 1 2 3
CN6 1 3
CN4 1 3
MD-P(+)
MD-P(-)
P
CB-61A BOARD
CN2 1 2 3
CN3 1 3
CN1 1 3
DR-187 BOARD
DOPEN11
DS-ON
GND
GND
DOPEN10
MD-P(+)
MD-P(-)

Fig. 2-2-30 Door Lock Block (section 2-2-9.)

### 2-2-10. DP-178 Board

The DP-178 board is installed at the top of the front panel of this cart machine. The major functions of this board are the current operation status display; initialize display, step display in test mode, self-diagnosis, and error information display from the CPU-107 board. This board does not only execute the display by a 5 x 7 dot matrix LED, but also can give warning by a buzzer function. This board also mounts six key switches on the display panel at the top of the front panel. When the switches are pressed, the key data is transferred to the CPU-107 board.
The functions of six key switches are shown in Table 2-2-9. Moreover, switches S1, S2, and S9 are mounted on the DP-178 board. Switch S1 is used to reset this board. Switches S2 (TEST) and S9 (ELV.POWER) are used for factory use.

S3 : CONTROL
S4 : CLEAR(10's digit)
S5 : INITIAL(1's digit)
S6 : RECOVER(EXECUTION/CANCEL)
S7 : EMERGENCY STOP
S8 : DOOR OPEN

Table. 2-2-9 Key Switch Functions (Section 2-2-10.)

For the key switch functions in Table 2-2-9, refer to sections 4-2, 4-9, 4-10, and 5-2.
Additionally, this board stores an hours meter during the power-down sequence and displays a tally lamp.

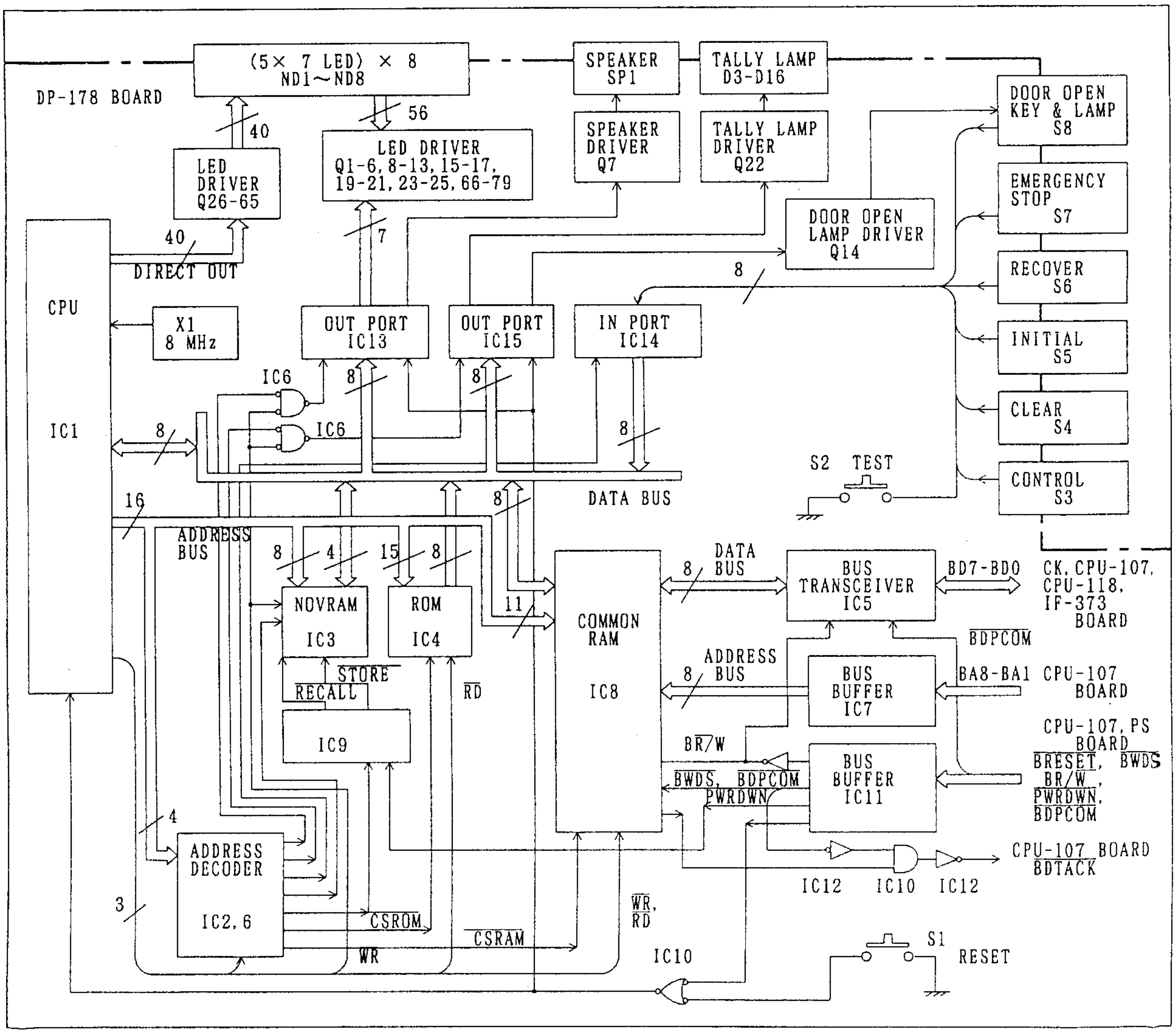

DP-178 BOARD
(5× 7 LED) × 8
ND1~ND8
SPEAKER SP1
TALLY LAMP D3-D16
DOOR OPEN KEY & LAMP S8
40
56
LED DRIVER Q26-65
LED DRIVER Q1-6, 8-13, 15-17, 19-21, 23-25, 66-79
SPEAKER DRIVER Q7
TALLY LAMP DRIVER Q22
EMERGENCY STOP S7
DOOR OPEN LAMP DRIVER Q14
RECOVER S6
INITIAL S5
CLEAR S4
CONTROL S3
40
7
8
DIRECT OUT
CPU
IC1
X1 8 MHz
OUT PORT IC13
OUT PORT IC15
IN PORT IC14
IC6
IC6
8
8
8
8
S2 TEST
DATA BUS
16
8
ADDRESS BUS
8
4
15
8
NOVRAM IC3
ROM IC4
11
COMMON RAM IC8
DATA BUS
8
BUS TRANSCEIVER IC5
BD7-BD0
CK, CPU-107, CPU-118, IF-373 BOARD
BDPCOM
STORE
RECALL
RD
ADDRESS BUS
8
BUS BUFFER IC7
BA8-BA1
CPU-107 BOARD
IC9
BR/W
BUS BUFFER IC11
CPU-107, PS BOARD
BRESET, BWDS
BR/W,
PWRDWN,
BDPCOM
BWDS, BDPCOM
PWRDWN
4
ADDRESS DECODER
IC2, 6
3
CSROM
CSRAM
WR
WR, RD
IC10
IC12
IC10
IC12
CPU-107 BOARD
BDTACK
S1
RESET

Fig. 2-2-31 DP-178 Board Block (Section 2-2-10.)

(1) Inports (IC5, IC7, IC11, and IC14)(Refer to Fig. 2-2-31.)

The data (D7 to D0) from the CPU-107 board are input to a bus transceiver (IC5), and the addresses (A8 to A1) are input to a bus buffer (IC7). Five control lines ($\overline{\text{BRESET}}$, $\overline{\text{BWDS}}$, BR/$\overline{\text{W}}$, $\overline{\text{PWRDWN}}$, and $\overline{\text{BDPCOM}}$) are input to a bus buffer (IC11).
These three information items are input through inports to a common RAM (IC8) for processing.
The key switch input on the front panel is available as other inports. IC14 is used for the key switch input.

(2) Outports (IC13 and IC15)(Refer to Fig. 2-2-31.)

IC13 and IC15 are a latch circuit. IC13 controls the lighting state of an LED. IC15 controls the tally lamps (LED × 14) and door open key (S8) LED at the top of the front panel. The eight 5 × 7 dot matrix LEDs (ND1 to ND8) on the display panel are driven by transistors. Therefore, there are 40 horizontal drive transistors and 56 vertical drive transistors. Horizontal data is directly input from the parallel port of a CPU (IC1) to the LED driver. Vertical data switches the LED driver from a data bus via a latch circuit (IC13).

(3) Central system processing on DP-178 board

The system clock of the address and data used on the DP-178 board is 4 MHz.
An I/O interface stores the data written from the CPU-107 board to a common RAM (IC8) in a nonvolatile RAM (IC3) and records the hours meter of access information and an hours counter. The hours meter is recorded in the nonvolatile RAM (IC3) by the power down signal ($\overline{\text{PWRDWN}}$) from the PS-330 board. The I/O interface also reads the information required for a CPU, system, and character generator from a PROM (IC4).
A CPU (IC1) is reset when switch S1 is pressed. It can also be manually reset using the reset signal ($\overline{\text{BRESET}}$ on the CPU-107 board) from a bus buffer (IC11).

The main control operation of the DP-178 board is described below.

- A substatus is turned on and off every second when the DP-178 board operates normally.
- Main routines
  Eight-digit character display during normal operation: (Example) Power ON/IN use
  Warning display: CONTROL/CLEAR/INITIAL/RECOVER/EMERGENCY STOP/DOOR OPEN
  Door open key read and buzzer control[1]
  Door open key LED control[1]
  Tally lamp control[1]
  Read and write of operation time (hours meter) in nonvolatile RAM
  Error display from each board: CPU-107, IF-373, CPU-118, DP-178, and RD-24 boards

(4) Memory map on DP-178 board

The memory map on this board is shown in Tables 2-2-10(1) and 2-2-10(2).

MEMORY MAP

Memory Map is as follows

| | |
|---|---|
| \$0000<br>\$7FFF | ROM |
| \$8000<br>\$80FF | Dual Port RAM(Common Area) |
| \$8100<br>\$87FF | Dual Port RAM(Local Area) |
| \$9000<br>\$90FF | NOVRAM data |
| | |

To be continued

Table. 2-2-10(1) Memory Map on DP-178 Board (1) (Section 2-2-10. (4))

---

[1] Buzzer control, LED control, and tally lamp control: Refer to the Flexicart Protocol and Command Specifications.

| | |
|---|---|
| | |
| $A000 | Point D-Flip Flop setting data to LED & SP |
| $B000 | Read Data of Key Switch |
| $C000 | Point D-Flip Flop lighting Key / ON AIR TALLY |
| $F000 | NOVRAM Recall |

Dual Port RAM Common Area Map is as follows

| | | |
|---|---|---|
| $08000 | sub_status | (DP-178 Status) |
| $08001<br>$08008 | sub_board_id | (Board ID "DP-178 ") |
| $08009<br>$08010 | version_no | (Version No. "V1.01 ") |
| $08011<br>$08030 | test_result | (Test Result "×××Error.. ") |
| $08031 | cmd_ok | (Hand Shake Area) |
| $08032 | ascii_bm_sel | (No Display / ASCII / Bitmap) |
| $08033<br>$0806A | char_data | (Display Data) |
| $0806B | alarm_atrib | (Alarm Attribute) |
| $0806C | blink_atrib | (Blink Attribute) |
| $0806D<br>$08074 | key_data | (Key ON/OFF Data) |
| $08075 | tally_on | (Tally Lamp ON/OFF flag) |
| $08076 | key_led_on | (LED of Key ON/OFF flag) |
| $08077 | key_led_blink | (LED of Key Blink Attribute) |
| $08078<br>$080F7 | nvram_data | (Data Area for NOVRAM) |
| $080F8<br>$080FF | reserve | |

I/O Map

CTC I/O Map is as follows

| | |
|---|---|
| $0010 | CTC Timer Control Register Channel 0 (Buzzer/Tr/Counter) |
| $0011 | CTC Timer Control Register Channel 1 (no use) |
| $0012 | CTC Timer Control Register Channel 2 (no use) |
| $0013 | CTC Timer Control Register Channel 3 (no use) |

I/O Port Map is as follows

| | | | |
|---|---|---|---|
| $0054 | Port A Data Direction Register | $0050 | Port A I/O Data Register |
| $0055 | Port B Data Direction Register | $0051 | Port B I/O Data Register |
| $0056 | Port C Data Direction Register | $0052 | Port C I/O Data Register |
| $0034 | Port D Data Direction Register | $0030 | Port D I/O Data Register |
| $0044 | Port E Data Direction Register | $0040 | Port E I/O Data Register |

Table. 2-2-10(2) Memory Map on DP-178 Board (2) (Section 2-2-10. (4))

## 2-2-11. IF-373 Board

The IF-373 board is an interface that controls the VTR and switcher connected to this cart machine.

This cart machine installs two IF-373 boards in the controller block on the rear panel. Whether the IF-373 board controls a switcher or VTR is determined by the slot position in which the IF-373 board is inserted. When the IF-373 board controls a switcher, it is inserted into slot No. 8. When the IF-373 board controls a VTR, it is inserted into slot No. 5. One IF-373 board can control two VTRs. To extend an optional VTR, an addition IF-373 board (BKFC-100) is inserted into slot Nos. 6 and 7. (Refer to Table 2-2-11.)

The IF-373 board autonomously senses the status of the VTR and switcher and sets the result in a common RAM between the IF-373 and CPU-107 boards. The IF-373 board also sends the specified contents of the command (from a high-level controller) from the CPU-107 board to the VTR or switcher via a common RAM.

The VTR control operation, switcher control operation, and main circuits of the IF-373 board are described next.

### (1) VTR control

① When VTR control command is received from high-level control (Refer to Figs. 2-2-32 and 2-2-33.)

- As shown in Fig. 2-2-32, this cart machine receives a command from a high-level controller and outputs it to a VTR. This cart machine first interfaces with the high-level controller by the serial ports on the CPU-107 board. It interfaces with the VTR by the serial ports on the IF-373 board. Since the high-level controller does not directly control the VTR, a time delay occurs from when a command is received from the high-level controller until it is issued to the VTR. The timing of a command exchange at each block is shown in Fig. 2-2-33. During command communication, if a command is issued from the high-level controller 5 msec or more (area A in the figure) before the leading edge in the first field, the CPU-107 board is started at the leading edge in the first field of the next frame. Also, a command is issued from the IF-373 board to the VTR at the leading edge in the first field of the next frame.

  Area B in Fig. 2-2-33 is the time required for synchronous processing.

| Slot Position of Controller Block | VTR |
|---|---|
| Slot No. 5 | VTR 1, 2 Use |
| Slot No. 6 | VTR 3, 4 Use |
| Slot No. 7 | VTR 5, 6 Use |

Table. 2-2-11 VTR Slot Position (Section 2-2-11.)

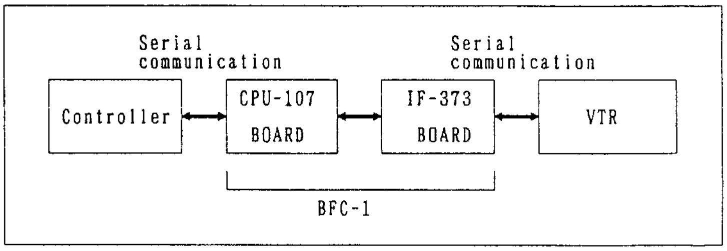


Fig. 2-2-32 Flow of VTR Control Command from High-Level Controller (Section 2-2-11. (1))

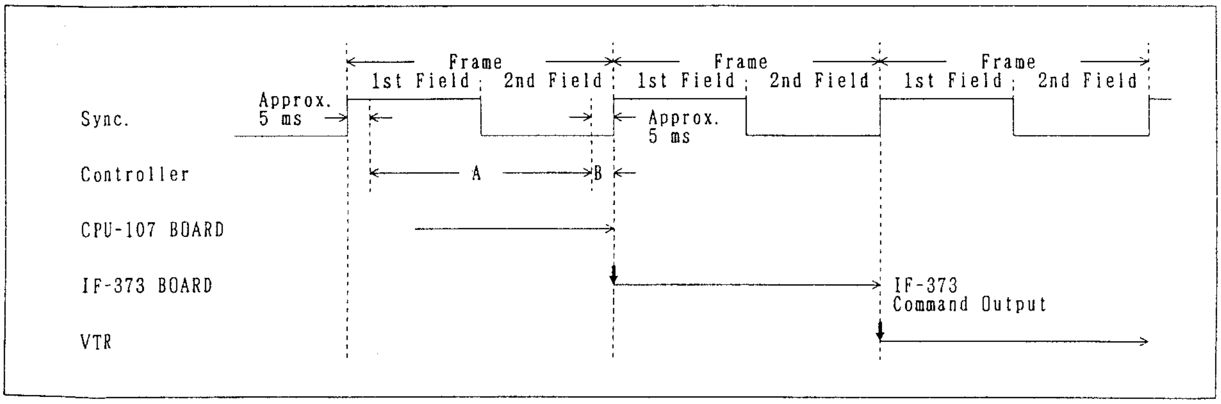


Fig. 2-2-33 Delivery Timing of VTR Control Command from High-Level Controller (Section 2-2-11. (1))

Therefore, if the high-level controller issues a command in area A preceding two frames to the CPU-107 board, the command can be executed in a safe timing.

- The high-level control whose timing is difficult to be kept in realtime supports a Turn On time command[1] to enable a realtime control.
- A macro command from the high-level controller and a Turn On Time command are controlled by the CPU on the CPU-107 board.

② When VTR status is sensed

- The IF-373 command executes the status sense at the leading edge in the first field and updates the internal common memory when no command is issued to the VTR.
- When a command send instruction is send from the high-level controller to the VTR, after a specified command was sent to the VTR at the leading edge in the next first field, sense the status.
- The tape time code of the VTR is usually sensed at the leading edge in the second field. When a TGC[2] or UB[3] preset command code is sent from the CPU-107 board, the TCG and UB preset commands are issued at the leading edge in the next second field.

③ The initialization below required for the VTR is automatically set by the IF-373 board after confirming that the communication with the VTR is established and that the remote mode is entered.

- Timer Mode select
- Field Lock select

④ A macro instruction for the VTR is executed by the IF-373 board. For more details of the macro instruction, refer to section 8-3 of Flexicart Protocol and Command Specifications.

⑤ The IF-373 board supervises the VTR status when the macro instruction for the VTR is executed. If the mode specified for the IF-373 board is not entered, a command retry is executed a maximum of two times. However, in the following case, an abnormal macro instruction is issued for termination without retry.

- When communication with the VTR is interrupted
- When a failure occurs in the VTR
- When the tape cannot be transported because it reached the end of a tape
- When no tape is inserted into the VTR
- When the VTR or cassette is in the REC INHIBIT mode irrespective a REC command

(2) Switcher control (Refer to Fig. 2-2-34.)

The IF-373 board controls each video and audio switcher by one RS-422A port.

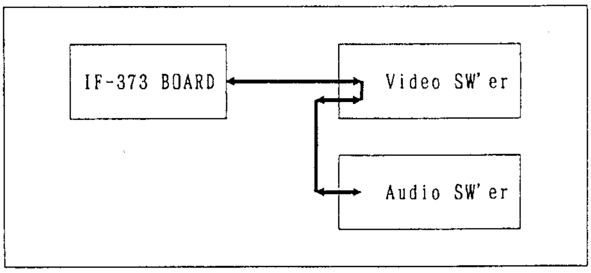


Fig. 2-2-34 Switcher Control (Section 2-2-11. (2))

① The data on all the crosspoints[4] on the IF-373 board is updated by the Crosspoint Select command[5] from the CPU-107 board. The updated data is sent to the switcher at the leading edge in the next first field. The IF-373 board also issues commands for all the crosspoints to the switcher at the leading edge in the first field for every frame even if no command is sent from the CPU-107 board. Therefore, the normal crosspoint state can return one frame after communication was recovered even when the switcher power is disconnected.

---

[1] Turn On Time command: This command specifies that the CPU-107 board issues the command specified by a PRESET command in the set trigger time. The following can be selected as a trigger.
•TIME TRIGGER: Issues a command at the specified time.
•PORT TRIGGER: Issues a command at the leading edge of a specified inport. (For more details, refer to the Flexicart Protocol and Command Specifications.)

[2] TCG: Time code generator

[3] UB: User's bit

[4] Crosspoint: Switch portion that connects the input pins to the output pins in a matrix switcher.

[5] Crosspoint Select command: Refer to the Flexicart Protocol and Command Specifications.

② The IF-373 board issues the following commands sequentially at the leading edge in the second field for every frame when no Monitor Select Set command is sent from the CPU-107 board.

- System Control Mode set
- Status sense for video switcher
- Status sense for audio switcher

③ When a Monitor Select Set command is sent from the CPU-107 board, the above operation is interrupted and the Monitor Select Set command is issued at the leading edge in the second field.

For more details on the above operation, refer to section 8-4 of Flexicart Protocol and Command Specifications.

(3) CPU (IC7)(Refer to Fig. 2-2-35.)

The CPU (IC7: HD64180ZP8) on the IF-373 board is a CMOS eight-bit single chip microprocessor. It incorporates a serial communication function and timer function and has an internal I/O register that controls these functions.

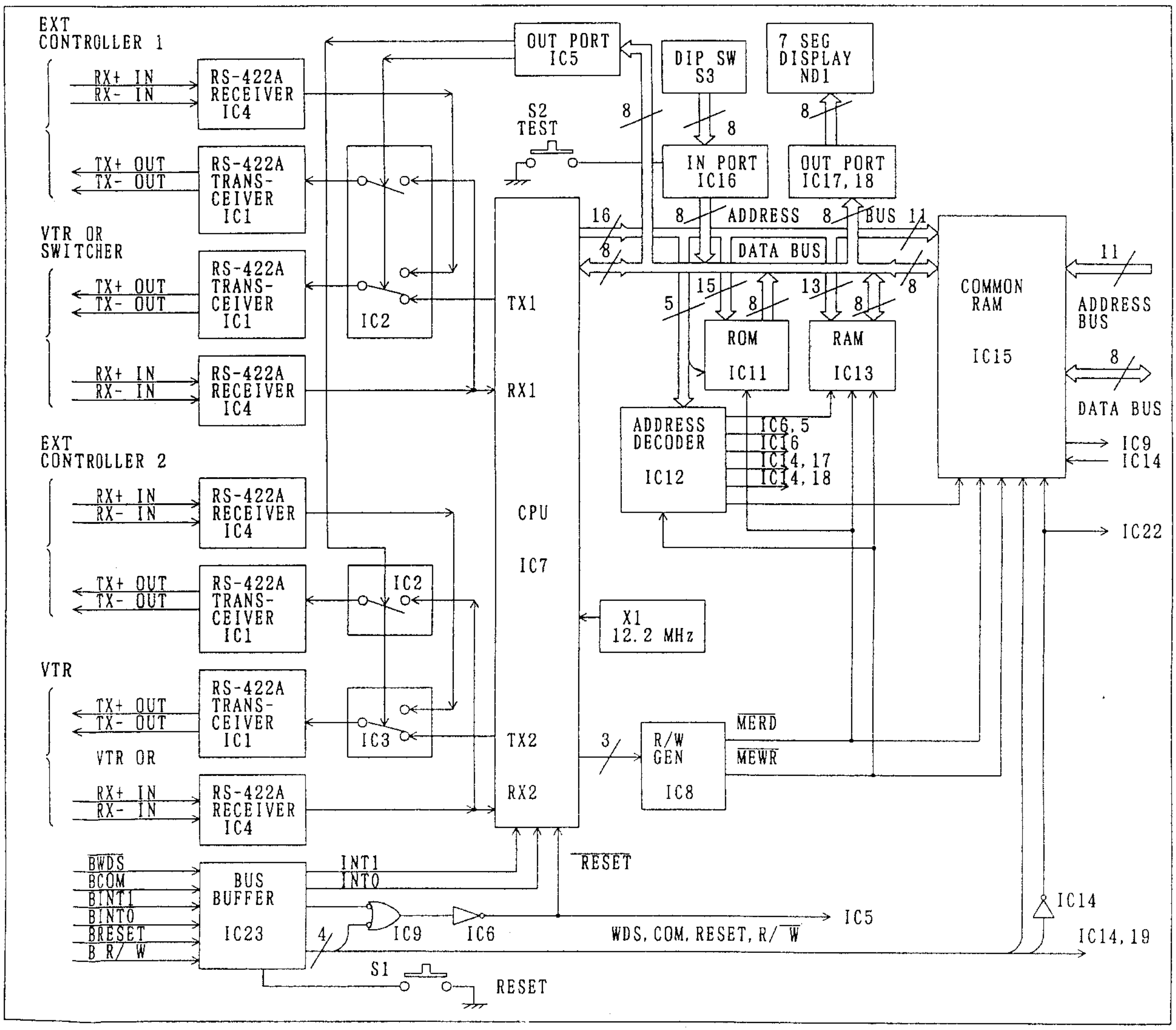

EXT CONTROLLER 1
RX+ IN
RX- IN
RS-422A RECEIVER IC4
TX+ OUT
TX- OUT
RS-422A TRANS-CEIVER IC1
VTR OR SWITCHER
RS-422A TRANS-CEIVER IC1
IC2
RX+ IN
RX- IN
RS-422A RECEIVER IC4
EXT CONTROLLER 2
RX+ IN
RX- IN
RS-422A RECEIVER IC4
TX+ OUT
TX- OUT
RS-422A TRANS-CEIVER IC1
IC2
VTR
TX+ OUT
TX- OUT
RS-422A TRANS-CEIVER IC1
IC3
VTR OR
RX+ IN
RX- IN
RS-422A RECEIVER IC4
OUT PORT IC5
S2 TEST
DIP SW S3
7 SEG DISPLAY ND1
8
8
8
IN PORT IC16
OUT PORT IC17, 18
16
8
ADDRESS
8
BUS
11
8
DATA BUS
5
15
8
13
8
8
TX1
RX1
CPU
IC7
TX2
RX2
ROM IC11
RAM IC13
ADDRESS DECODER IC12
IC6, 5
IC16
IC14, 17
IC14, 18
COMMON RAM IC15
11
ADDRESS BUS
8
DATA BUS
IC9
IC14
IC22
X1 12.2 MHz
3
R/W GEN IC8
MERD
MEWR
BWDS
BCOM
BINT1
BINT0
BRESET
B R/W
BUS BUFFER IC23
INT1
INT0
RESET
4
IC9
IC6
WDS, COM, RESET, R/W
IC5
IC14
IC14, 19
S1
RESET

Fig. 2-2-35 CPU (IC7) on IF-373 Board and Its Peripheral Circuit (Section 2-2-11. (3) to (9))

An oscillator uses a crystal oscillator (X1) of 12.2 MHz. A clock of 12.2 MHz is frequency-divided inside a CPU (IC7), and a clock of 6.1 MHz is used as a clock for the CPU. The clock obtained when this clock is frequency-divided is also used for a baud rate generator.

Two-channel serial ports (IC1 and IC4) are provided. They are used for an asynchronous VTR and switcher control. Since the baud rate generator for serial ports inside the CPU (IC7) is used for only RS-422A, the baud rate generator generates only 38.4 kbps.

The CPU (IC7) has four-level interrupts. Only interrupts INT0 and INT1 are used.

The number of address lines in the CPU (IC7) is 18. On the IF-373 board, only low-level 16 address lines are used. The number of data buses is 8 because of an eight-bit CPU.

(4) Memory (ROM: IC11, RAM: IC13)(Refer to Fig. 2-2-35.)

The ROM (IC11: TMS27C256) is a CMOS 256k-bit ROM, and the RAM (IC13: LH5168) is an 8k-byte static RAM.

(5) Serial ports (IC1, IC2, IC3, and IC4)(Refer to Fig. 2-2-35.)

Two serial ports are provided for the outside. They are used in RS-422A. IC1 is an RS-422A transceiver, and IC4 is an RS-422A receiver. IC2 and IC3 are a select switch for an external controller. By selecting these switches, the VTR and switcher can be directly controlled by the external controller.

(6) Common RAM (IC15)(Refer to Figs. 2-2-35 and 2-2-36.)

The IF-373 board and main CPU (CPU-107) board communicate via this common RAM (IC15: MB8422). An address decoder (IC19: SN74HC85) controls the access between the two boards, that is, controls so that the two boards do not access simultaneously.

(7) Inport (IC16)(Refer to Fig. 2-2-35.)

An inport (IC16: SN74HC541) reads the data of a test switch (S2) and DIP switch (S3) and outputs it.

(8) 7-segment LED (ND1)(Refer to Fig. 2-2-35.)

The 7-segment LED (ND1) is primarily used to display the state of this IF-373 board. This LED (ND1) is controlled by the D-type flip-flop circuit of parallel ports (IC17 and IC18: SN74HC374). The display data input to IC17 and IC18 is latched and output to the LED (ND1) for display.

(9) Bus buffers (IC20, IC21, and IC23) and bus transceiver (IC22)(Refer to Figs. 2-2-35 and 2-2-36.)

The IF-373 board is connected to the bus on the motherboard via bus buffers (IC20, IC21, and IC23: SN74ALS541) and bus transceiver (IC22: SN74ALS245).

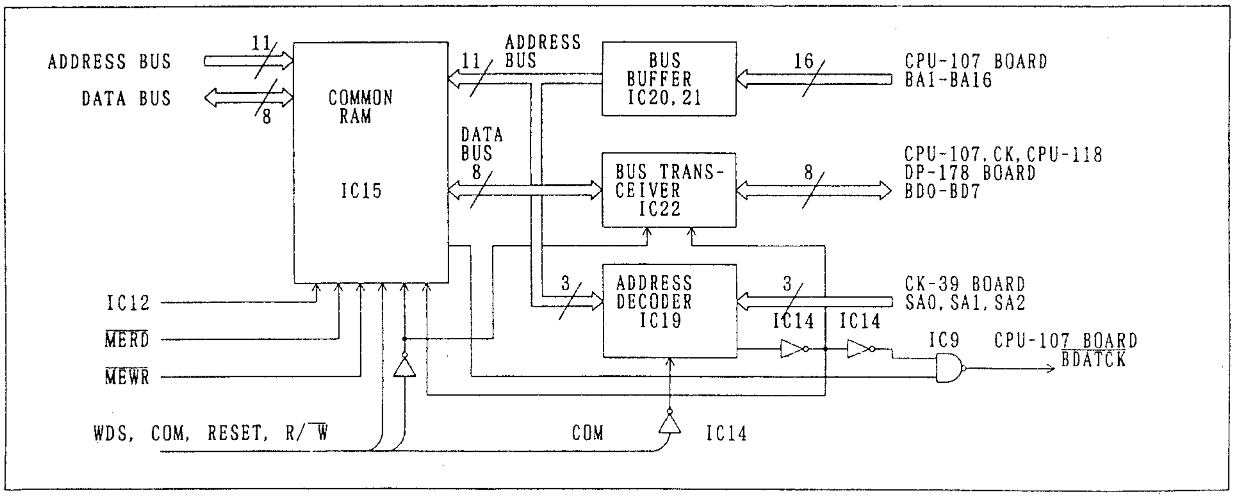

ADDRESS BUS
DATA BUS
11
8
COMMON RAM
IC15
11
ADDRESS BUS
DATA BUS
8
BUS BUFFER IC20, 21
16
CPU-107 BOARD
BA1-BA16
BUS TRANS-CEIVER IC22
8
CPU-107, CK, CPU-118
DP-178 BOARD
BD0-BD7
3
ADDRESS DECODER IC19
3
CK-39 BOARD
SA0, SA1, SA2
IC14
IC14
IC9
CPU-107 BOARD
BDATCK
IC12
MERD
MEWR
WDS, COM, RESET, R/W
COM
IC14

Fig. 2-2-36 Bus Buffers (IC20, IC21, and IC22) and Address Decoder (IC19) on IF-373 Board (Section 2-2-11. (6) and (9))

(10) Memory map on IF-373 board

The memory map on the IF-373 board is shown in Table 2-2-12.

| | | |
|---|---|---|
| $A0:E800<br>$A0:E7FF | Common RAM (2 k bits) | |
| $A0:E000<br>$A0:DFFF | IN PORT<br>DIP SWITCH (S3) D0~D6<br>TEST SWITCH (S1) D7 | |
| $A0:C000<br>$A0:BFFF | Reserved | |
| $A0:A003 | RS-422A LINE SELECTOR | $A0:A002 |
| $A0:A002 | 7 SEGMENT LED (ND1) High Order Bits | $A0:A001 |
| $A0:A001 | 7 SEGMENT LED (ND1) Low Order Bits | $A0:A000 |
| $A0:A000<br>$A0:9FFF | Work RAM (8 k bits) | |
| $A0:8000<br>$A0:7FFF | ROM (32 k bits) | |
| $A0:0000 | | |

Table. 2-2-12 Memory Map on the IF-373 Board (Section 2-2-11. (10))

### 2-2-12. SE-192 and SE-193 Boards

The SE-192 board is the photo detector board of a protrusion sensor block. The SE-193 board is the photo emitter board. The SE-192 board is installed at the top of the cart, and the SE-193 is installed at the bottom of it. These boards supervise the path through which an elevator passes and detect an obstacle in the path. The SE-192 and SE-193 boards are primarily classified into the following blocks.

- Protrusion sensor block
- Connection block of servo motor encoder pulse (Refer to Fig. 2-2-38.)
- Termination block of bin sensor control line (Refer to Fig. 2-2-38.)

The connection block of a servo motor encoder pulse on the SE-192 board inputs an encoder pulse from the CB-50 board and outputs it to the IF-401 board.
The termination block of a bin sensor control line on the SE-193 board terminates the control line on the bin cassette sensor board (SE-198 or SE-200 board). Since the user can extend the bin cassette sensor board as an option, the control line is terminated not on the bin cassette sensor board, but on the SE-193 board.
The protrusion sensor block that functions as a main block of these boards is described below.

(1) LED block on SE-193 board (Refer to Figs. 2-2-37 and 2-2-39.)

The SE-192 board mounts 13 photo sensors (GP1U59XB), and the SE-193 board mounts 13 infrared LEDs (SE1003-C). These LEDs and photo sensors correspond in a ratio of 1 to 1.
A pulse of 4 MHz is generated using an oscillator (X1) (IC2), and a pulse of 40 kHz, 1600 Hz, and 800 Hz is produced using frequency dividers (IC1 and IC4). A pulse of 800 Hz is input to a hexadecimal counter (IC5) and counted in the range of 0 to 15. This count value is converted into a pulse of SNS1 to SNS13 (Y0 to Y12) using line decoders (IC6 and IC7) and passed through LED drivers (Q1 to Q13) to turn on the infrared LEDs (D1 to D13) corresponding to Y0 through Y12 sequentially one at a time.
At that time, the same count value is sent to the D-type flip-flop circuits (IC3, IC10, IC17, IC24, IC4, IC14, and IC21)(corresponding to Y0 through Y12) on the SE-192 board so as to latch the signals sensed by each sensor.

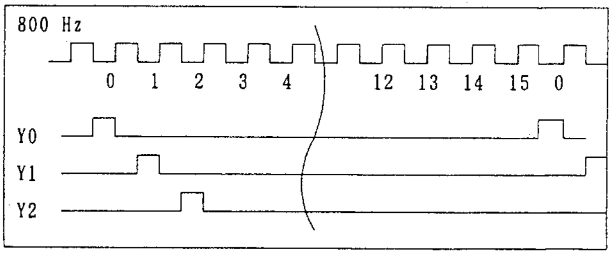


Fig. 2-2-37 LED Drive Waveform (Section 2-2-12. (1))

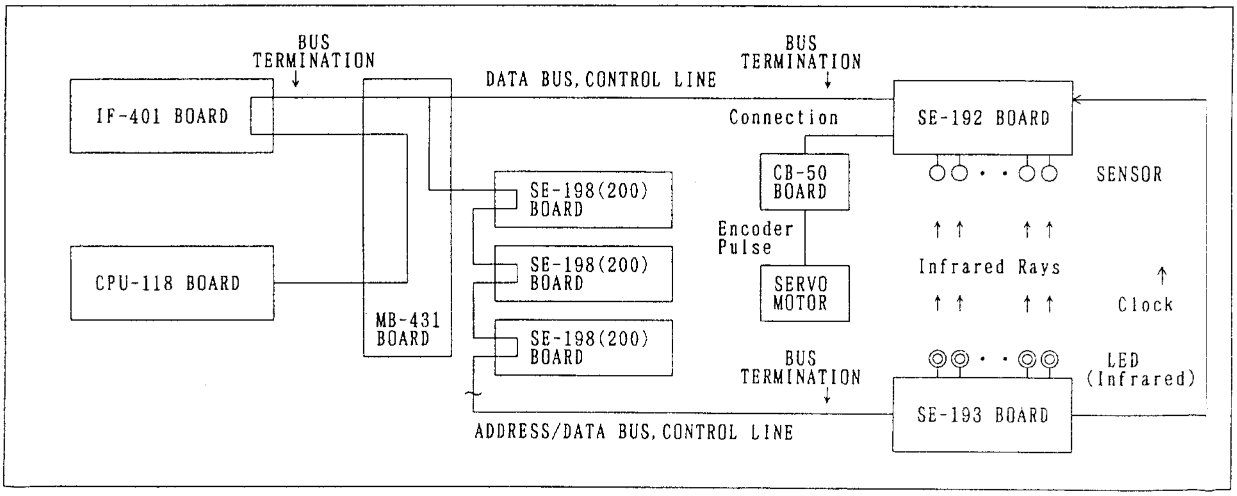

BUS TERMINATION
BUS TERMINATION
DATA BUS, CONTROL LINE
IF-401 BOARD
Connection
SE-192 BOARD
SE-198(200) BOARD
CB-50 BOARD
SENSOR
Encoder Pulse
Infrared Rays
SE-198(200) BOARD
CPU-118 BOARD
SERVO MOTOR
Clock
MB-431 BOARD
SE-198(200) BOARD
BUS TERMINATION
LED (Infrared)
SE-193 BOARD
ADDRESS/DATA BUS, CONTROL LINE

Fig. 2-2-38 Protrusion Sensor Block (on SE-192 and SE-193 Boards) and Its Peripheral Boards (Section 2-2-12.)

(2) Photo sensor circuit on SE-192 board (Refer to Figs. 2-2-39 and 2-2-40.)

A pulse of 1600 Hz and 800 Hz produced on the SE-193 board is input to the clock pin and data input pin of the D-type flip-flop circuit (IC3) on the SE-192 board, and a pulse whose phase is advanced by 125 μ sec is output from pin 6 ($\overline{Q}$) of IC3. This signal is then input to the enable pin (pin 4) of line decoders (IC13 and IC18). Therefore, the output signal of these line decoders are advanced by 125 μsec and enabled with respect to that of the line decoders on the SE-193 board. While the output pulse of the line decoders (positive logic IC) on the SE-193 board is "High" level, the LED is turned on, and the LED data is input to the photo sensor on the SE-192 board. The photo sensor data is input to the line decoders (negative logic IC). Since the line decoders have already been put into the enable state, it latches the photo sensor data at the leading edge of a clock signal.

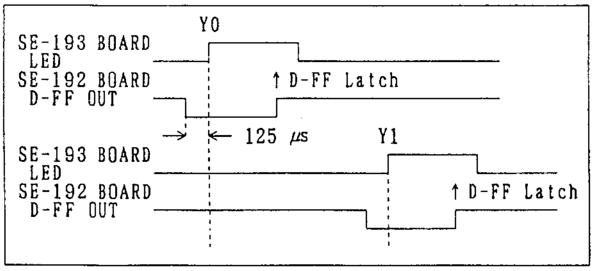


Fig. 2-2-39 D-Type Flip-Flop Output on SE-192 Board (Section 2-2-12. (1) and (2))

(3) Communication with CPU-118 board (Refer to Fig. 2-2-40.)

The output data of 13 photo sensors is latched using D-type flip-flop circuits (IC3, IC10, IC17, IC24, IC4, IC14, and IC21), and the 13 data items are ANDed using a NAND gate (IC5). The resultant data is sent from a bus buffer (IC7) to the CPU-118 board via the IF-401 board.

The output SDO data of the bus buffer (IC7) is set "Low" level when it does not protrude. Among 13 pairs of LEDs and photo sensors, if even one pairs protrude and no light is passible, the output SDO data is set "High" level. The output SD1 data of IC7 is set "Low" level when the SE-192 board is connected to the SE-193 board. It is set "High" level when the SE-192 board is not connected to the SE-193 board.

An LED (red)(D1) is connected to the output line of the NAND gate. The LED lights when it senses protrusion.

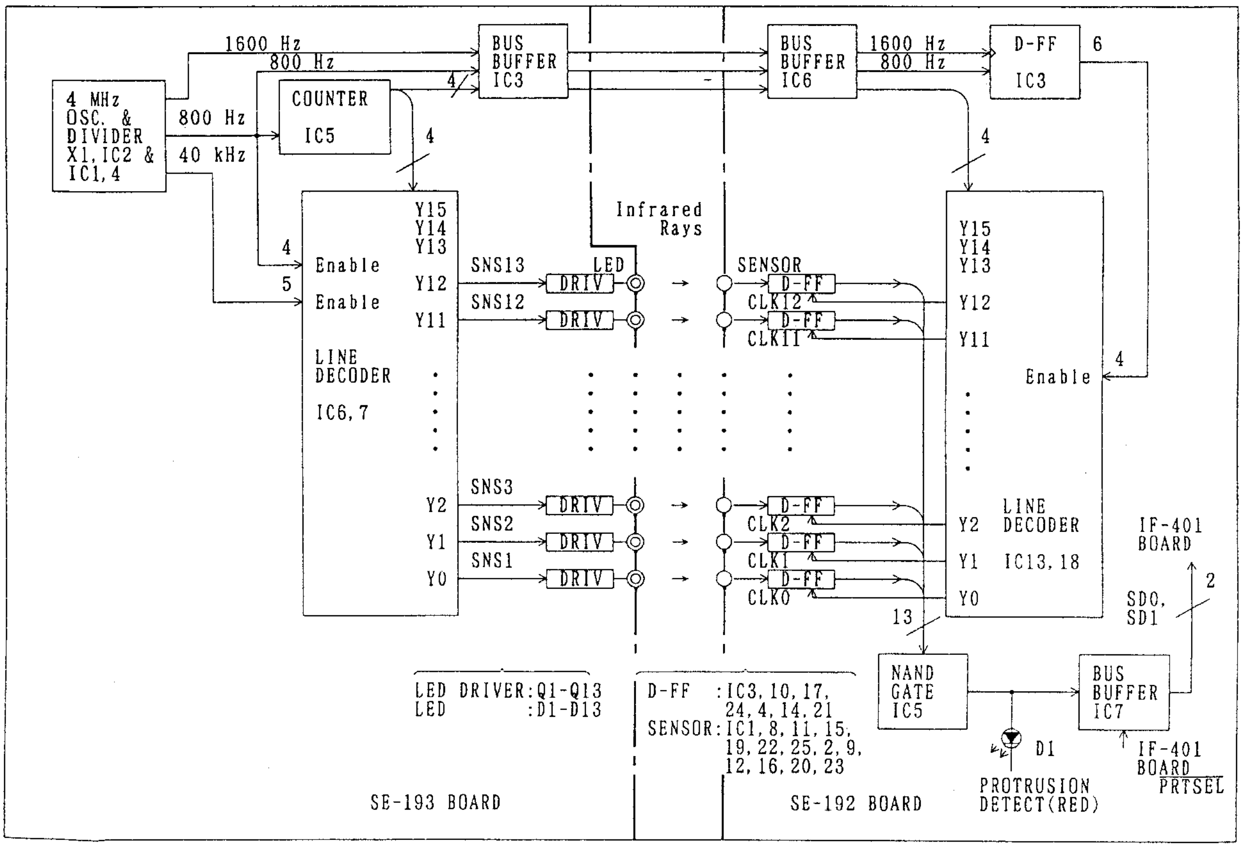

1600 Hz
800 Hz
4 MHz OSC. & DIVIDER X1, IC2 & IC1, 4
800 Hz
40 kHz
COUNTER IC5
BUS BUFFER IC3
4
4
5
Enable
Enable
Y15
Y14
Y13
Y12
Y11
Y2
Y1
Y0
LINE DECODER IC6, 7
SNS13
SNS12
SNS3
SNS2
SNS1
LED
DRIV
Infrared Rays
SENSOR
D-FF
CLK12
CLK11
CLK2
CLK1
CLK0
BUS BUFFER IC6
1600 Hz
800 Hz
D-FF IC3
6
4
4
Enable
LINE DECODER IC13, 18
13
NAND GATE IC5
BUS BUFFER IC7
D1
PROTRUSION DETECT(RED)
IF-401 BOARD
2
SDO, SD1
IF-401 BOARD PRTSEL
LED DRIVER:Q1-Q13
LED :D1-D13
D-FF :IC3, 10, 17, 24, 4, 14, 21
SENSOR:IC1, 8, 11, 15, 19, 22, 25, 2, 9, 12, 16, 20, 23
SE-193 BOARD
SE-192 BOARD

Fig. 2-2-40 Protrusion Sensor Block (on SE-192 and SE-193 Boards)(Section 2-2-12. (2) and (3))

## 2-2-13. SE-198 and SE-199 (SE-200 and SE-201) Boards

The SE-198 and SE-199 (SE-200 and SE-201) boards are the bin cassette sensor board that detects the existence and size of the cassette contained in a bin unit[1] in realtime.

The SE-198 and SE-199 boards are the bin cassette sensor board of a bin unit that contains BETACAM and S-VHS cassettes. The SE-199 board consists of SE-199A and SE-199B boards. The SE-199A board is used for bin unit BKFC-10B (for BETACAM), and the SE-199B board is used for bin unit BKFC-10S (for S-VHS).

The SE-200 and SE-201 boards are the bin cassette sensor board used for bin unit BKFC-8D (for D-2).

The SE-198 and SE-200 boards are the photo detector board, and the SE-199 and SE-201 boards are the photo emitter board. The SE-198 and SE-199 (SE-200 and SE-201) boards are used in pairs one at a time for every bin unit. The photo detector (SE-198 (SE-200)) board is installed on the right side, and the photo emitter (SE-199 (SE-201)) board is installed on the left side of a bin unit.

The bin unit can be extended as an option in units of one unit (4 U[2]). Therefore, the bin cassette sensor board also varies depending on the type of the bin unit or the number of extended bin units.

The number of cassettes contained in one bin unit is determined by the number of shelves and the number of cassettes per shelf. The number of shelves per unit is 5 for a BETACAM or S-VHS cassette, and 4 for a D-2 cassette. (Refer to Table 2-1-1.)

The number of cassettes inserted per bin unit shelf is 2 for an S cassette, 1 for an M cassette, and 1 for an L cassette. The number of inserted cassettes corresponds to the size of the cassette. For an S-VHS cassette, two standard cassettes can be inserted. However, the S-VHS cassette does not correspond to a C cassette. (Refer to Table 2-1-2.)

The SE-198 and SE-199 (SE-200 and SE-201) boards are primarily classified into the following blocks.

- Cassette size sensor block
- Communication with CPU-118 board
- Bin lamp block

The SE-198 and SE-199 board blocks, and the SE-200 and SE-201 board blocks that differ from the SE-198 and SE-199 boards are described below.

(1) Cassette size sensor block

The SE-198 board mounts 10 photo transistors (PH110)(two photo transistors per shelf), and the SE-199 board mounts 10 infrared photo-LEDs (SE1003) (two photo-LEDs per shelf).

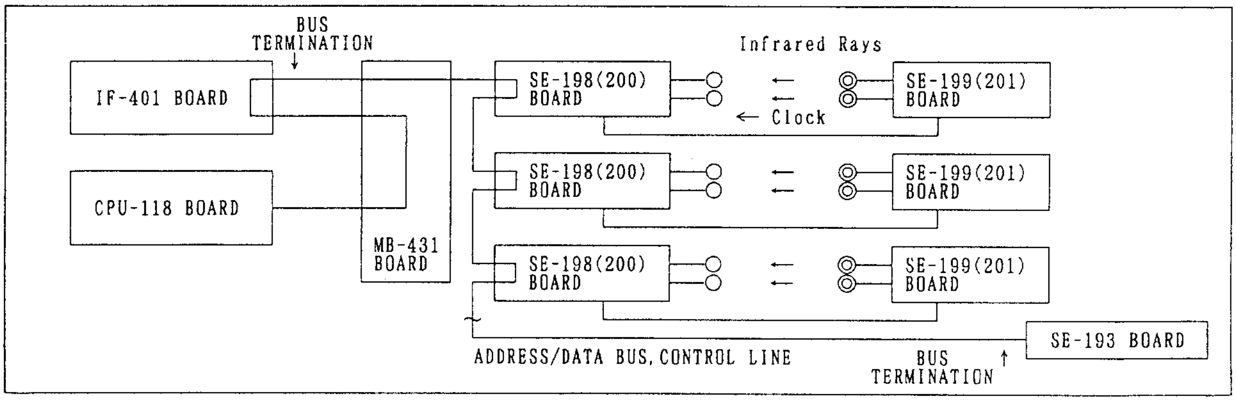


Fig. 2-2-41 Bin Cassette Sensor Block (on SE-198, SE-199, SE-200, and SE-201 Boards) and Its Peripheral Boards (Section 2-2-13.)

---

[1] Bin unit: The bin unit has a shelf consisting of four or five stages and contains multiple cassettes.

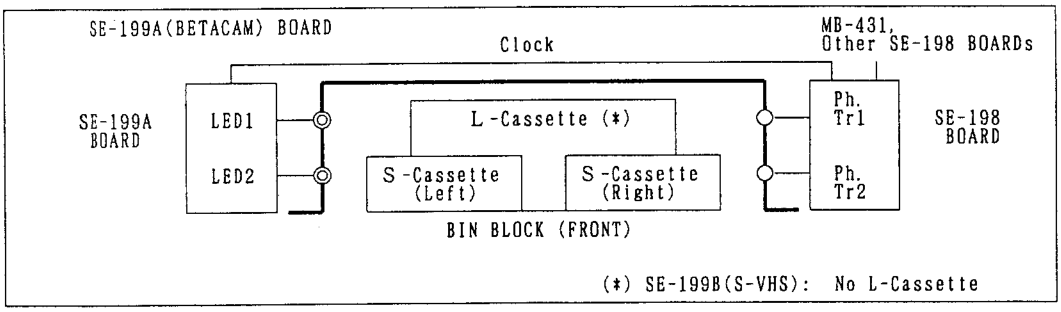
| Bin unit | Cassette | Number of bins (shelves) |
|---|---|---|
| BKFC-10B | BETACAM | 5 shelves/bin unit |
| BKFC-10S | S-VHS | 5 shelves/bin unit |
| BKFC-8D | D-2 | 4 shelves/bin unit |

[2] 1 U: Approximately 4.25 cm

The SE-200 board mounts 12 photo transistors (three photo transistors per shelf), and the SE-201 board mounts 12 infrared LEDs (three infrared LEDs per shelf).
The detection of the cassette size by these photo transistors and infrared LEDs is described next.

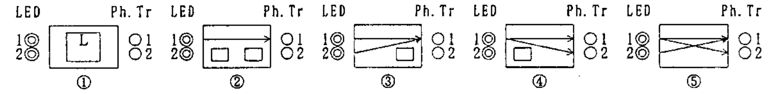
① Cassette size sensor (Refer to Figs. 2-2-42 and 2-2-43 and Tables 2-2-13 and 2-2-14.)

The SE-198 and SE-199 boards are arranged as shown in Fig. 2-2-42 when one shelf of the bin unit (BKFC-10B) for BETACAM is viewed from the top. The SE-198 board is connected to the motherboard so as to communicate with the CPU-118 board. The SE-199 board is connected to the SE-198 board. The SE-198 and SE-199 boards detect the infrared rays connecting between the two infrared LEDs (LED1 and LED2) on the SE-199 board and the two photo transistors (Ph. Tr1 and Ph. Tr2) on the SE-198 so as to discriminate the existence of a cassette and the L and S size. Table 2-2-13(i) shows the discrimination of the existence of a BETACAM cassette, and the L and S size. Table 2-2-13(ii) shows the discrimination of the existence of an S-VHS cassette.
The SE-200 and SE-201 boards are arranged as shown in Fig. 2-2-43 when one shelf of the bin unit (BKFC-8D) for D-2 is viewed from the top.
The SE-200 and SE-201 boards also detects the infrared rays connecting between the three infrared LEDs (LED 1, LED2, and LED3) on the SE-201 board and the three photo transistors (Ph. Tr1, Ph. Tr2, and Ph. Tr3) on the SE-200 board so as to discriminate the existence of a D-2 cassette, and the L, M, and S size.


SE-199A(BETACAM) BOARD
Clock
MB-431,
Other SE-198 BOARDs
SE-199A
BOARD
LED1
LED2
L-Cassette (*)
S-Cassette
(Left)
S-Cassette
(Right)
Ph.
Tr1
Ph.
Tr2
SE-198
BOARD
BIN BLOCK (FRONT)

(*) SE-199B(S-VHS): No L-Cassette

Fig. 2-2-42 Arrangement of SE-198 and SE-199 Boards in Bin Unit (Section 2-2-13. (1))


LED
Ph. Tr
1
2
L
1
2
①
②
③
④
⑤

( i )BKFC-10B(BETACAM:SE-198/199A boards)

| | | | | | |
|---|---|---|---|---|---|
| (*)LED1 →Ph. Tr1<br>LED1 →Ph. Tr2<br>LED2 →Ph. Tr1 | ① 0<br>0<br>0 | ② 1<br>0<br>0 | ③ 1<br>0<br>1 | ④ 1<br>1<br>0 | ⑤ 1<br>1<br>1 |
| Cassette | L Cassette | S Cassettes(R, L) | S Cassette (R) | S Cassette (L) | – |

( ii )BKFC-10S(S-VHS:SE-198/199B boards)

| | | | | | |
|---|---|---|---|---|---|
| (*)LED1 →Ph. Tr1<br>LED1 →Ph. Tr2<br>LED2 →Ph. Tr1 | | ② 1<br>0<br>0 | ③ 1<br>0<br>1 | ④ 1<br>1<br>0 | ⑤ 1<br>1<br>1 |
| Cassette | | S Cassettes(R, L) | S Cassette (R) | S Cassette (L) | – |

(*) passable : 1, impassable : 0

Table. 2-2-13 Existence of Cassette and Discrimination of Size on SE-198 and SE-199 Boards (Section 2-2-13. (1))

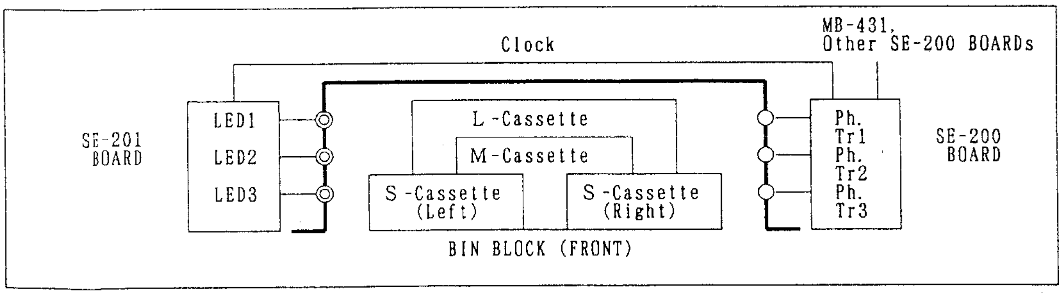
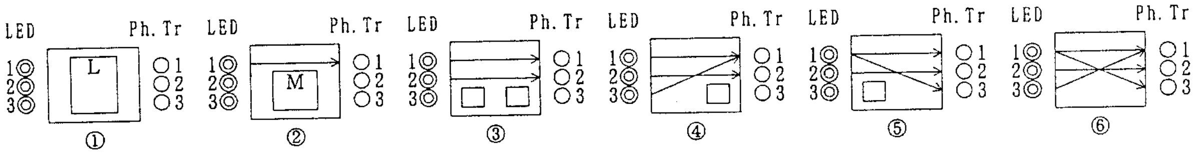

Clock
MB-431,
Other SE-200 BOARDs
SE-201
BOARD
LED1
LED2
LED3
L-Cassette
M-Cassette
S-Cassette
(Left)
S-Cassette
(Right)
Ph.
Tr1
Ph.
Tr2
Ph.
Tr3
SE-200
BOARD
BIN BLOCK (FRONT)

Fig. 2-2-43 Arrangement of SE-200 and SE-201 Boards in Bin Unit (Section 2-2-13. (1))

Table 2-2-14 shows the existence of a D-2 cassette and the discrimination of the size.

② Infrared LED block on SE-199 (SE-201) board (Refer to Figs. 2-2-44, 2-2-45, and 2-2-46.)

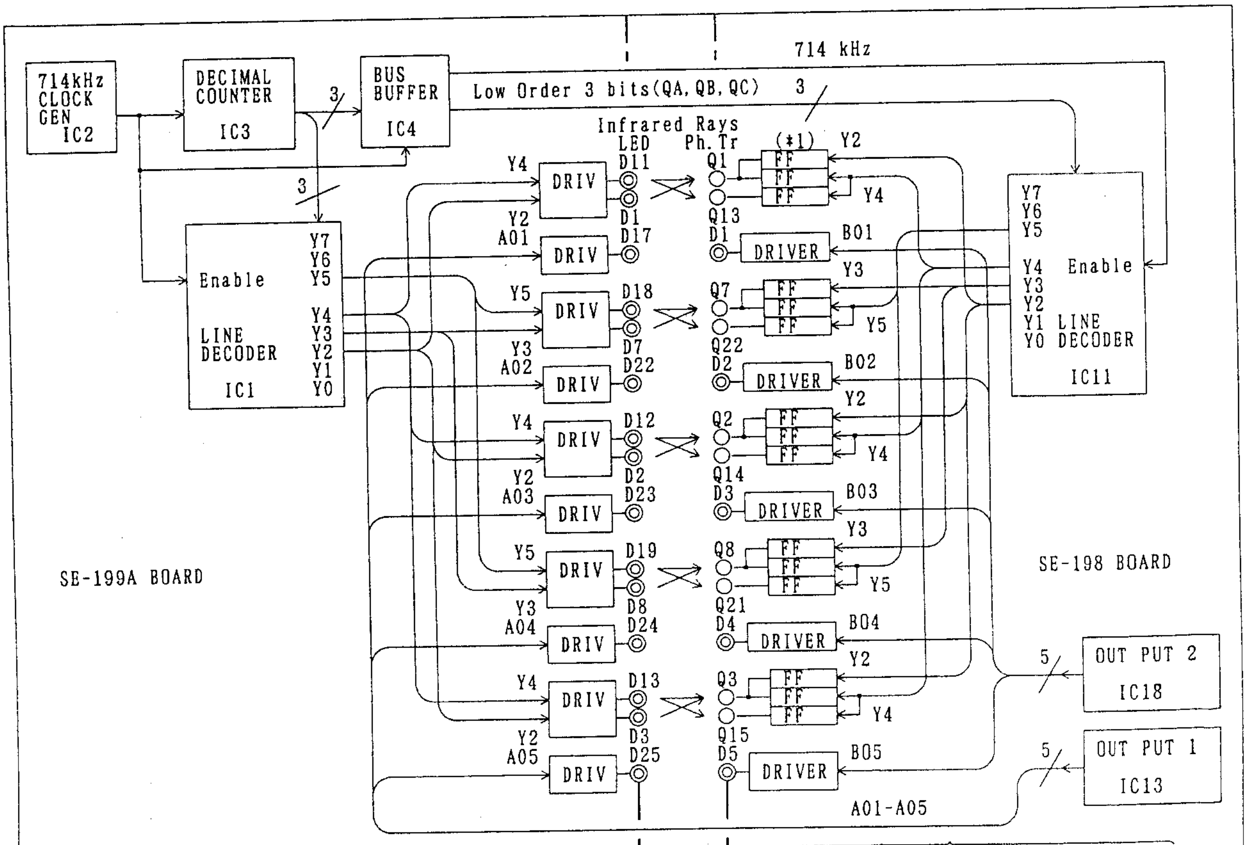
The infrared LED block on the SE-199 board is shown in Fig. 2-2-44. The SE-201 board is also the same in theory.
The theory in which the LED is turned on and the photo transistor data is latched into a D-type flip-flop circuit is the same as for the SE-192 and SE-193 boards.


LED
Ph.Tr
1◎
2◎
3◎
○1
○2
○3
L
M
①
②
③
④
⑤
⑥

| (*) LED1 → Ph.Tr1<br>LED2 → Ph.Tr2<br>LED1 → Ph.Tr3<br>LED3 → Ph.Tr1 | ① 0<br>0<br>0<br>0 | ② 1<br>0<br>0<br>0 | ③ 1<br>1<br>0<br>0 | ④ 1<br>1<br>0<br>1 | ⑤ 1<br>1<br>1<br>0 | ⑥ 1<br>1<br>1<br>1 |
|---|---|---|---|---|---|---|
| Cassette | L Cassette | M Cassette | S Cassettes (R, L) | S Cassette (R) | S Cassette (L) | – |

(*) passable : 1, impassable : 0

Table. 2-2-14 Existence of Cassette and Discrimination of Size on SE-200 and SE-201 Boards (Section 2-2-13. (1))


714 kHz
714kHz CLOCK GEN IC2
DECIMAL COUNTER IC3
BUS BUFFER IC4
Low Order 3 bits(QA, QB, QC)
3
Infrared Rays
LED
Ph.Tr
(*1)
Enable
LINE DECODER
IC1
Y7
Y6
Y5
Y4
Y3
Y2
Y1
Y0
DRIV
DRIVER
FF
D11
D1
D17
D18
D7
D22
D12
D2
D23
D19
D8
D24
D13
D3
D25
Q1
Q13
Q7
Q22
Q2
Q14
Q8
Q21
Q3
Q15
D1
D2
D3
D4
D5
A01
A02
A03
A04
A05
B01
B02
B03
B04
B05
Enable
LINE DECODER
IC11
SE-199A BOARD
SE-198 BOARD
OUT PUT 2
IC18
OUT PUT 1
IC13
5
A01-A05

LED(SE1003) :D1-3, 7, 8, 11-13, 18, 19,
LED DRIVER(for SE1003) :Q1-Q11, 13-15,

LED(TLR114A) :D17, 22-25
LED DRIVER(for TLR114A):Q12, 16-19

FF :IC12, 14, 16, 19
(*1)D-FF for Q1 :IC12, 16
(*1)D-FF for Q13 :IC16
LED(TLR114A) :D1-5
LED DRIVER(for TLR114A) :Q11, 12, 19, 20, 23

Fig. 2-2-44 Cassette Size Sensor Block ( on SE-198 and SE-199 Boards) (Section 2-2-13. (1) and (3))

IC2 (NE555) on the SE-199 board is a clock generator that generates a pulse of 714 kHz. The pulse is input to a decimal counter (IC3) and counted in the range of 0 to 10. The count value is input to a line decoder (IC1). In this line decoder, Y2, Y3, Y4, and Y5 pulses are output, and the infrared LEDs corresponding to the Y2, Y3, Y4, and Y5 signals sequentially light one at a time. The same count value is also sent to the SE-198 board at that time, and the sensor data corresponding to the Y2, Y3, Y4, and Y5 pulses is latched into D-type flip-flop circuits (IC12, IC14, IC16, and IC19). The input/output timing chart of a line decoder (IC1) when the LED lights is shown in Fig. 2-2-45.
A clock pulse is input to the enable pin of the line decoder (IC1). Therefore, while the clock pulse is "Low" level (approximately 150 µsec), the output signal of the line decoder (IC1) is enabled and the LED lights.

③ Photo transistor data latch circuit on SE-198 (SE-200) board (Refer to Figs. 2-2-44, 2-2-45, and 2-2-46.)

The 714-kHz clock pulse and counter pulses (QA, QB, and QC) on the SE-199 board are sent to the line decoder (IC1) on the SE-199 board, and simultaneously, sent to the line decoder (IC11) on the SE-198 board. The output signal of IC11 is sent to the clock pin of D-type flip-flop circuits (IC12, IC14, IC16, and IC19) to latch the photo transistor data corresponding to infrared LEDs into the D-type flip-flop circuits.
The output signal of photo transistors is input through Schmidt trigger buffers (IC9 and IC10) to the D-type flip-flop circuits. As a result, the output pulse of photo transistors is delayed slightly, and the photo transistor data is securely latched at the leading edge of an output pulse of IC11 that is input to the clock pin of D-type flip-flop circuits.

④ Infrared LEDs and their corresponding photo transistors (Refer to Figs. 2-2-44 and 2-2-46.)

Take the case of the infrared LEDs (D11 and D1) on the SE-199 board and the photo transistors (Q1 and Q13) on the SE-198 board. The LEDs and their corresponding photo transistors in one shelf of a bin unit are described below.
When the counter (IC3) on the SE-199 board outputs "2", the line decoders (IC1 and IC11) on the SE-199 and SE-198 boards are synchronized and sets a Y2 pulse "Low" level. When the Y2 pulse is set "Low" level, the LED driver on the SE-199 board is turned on and the LED (D1) lights. And simultaneously, the Y2 pulse is input to the clock pin of the D-type flip-flop circuit (IC12) to which the output pin of the photo transistor (Q1) on the SE-198 board is connected, and only the photo transistor (Q1) data of the received photo transistor (Q1 and Q13) data is latched into IC12. The data is then output from the D-type flip-flop circuit (IC12) to the D-type flip-flop circuit (IC15).
When the counter (IC3) on the SE-199 board outputs "4", the line decoders (IC1 and IC11) on the SE-199 and SE-198 boards are synchronized and sets a Y4 pulse "Low" level. The LED (D11) then lights. On the SE-198 board, the Y4 pulse is input to the clock pin of a D-type flip-flop circuit (IC16). The received photo transistor (Q1 and Q3) data is latched, and the data from a photo transistor (Q1) is input to a D-type flip-flop circuit (IC20) and the data from a photo transistor (Q13) is input to a D-type flip-flop circuit (IC17).
These data items are read to sense the size of a cassette in the shelf of a bin unit.

(2) Communication with CPU-118 board (Refer to Fig. 2-2-46.)

The SE-198 (SE-200) board is connected to the IF-401 board via a bus buffer (IC7) and bus transceiver (IC1) and communicates with the CPU-118 board via the IF-401 board.

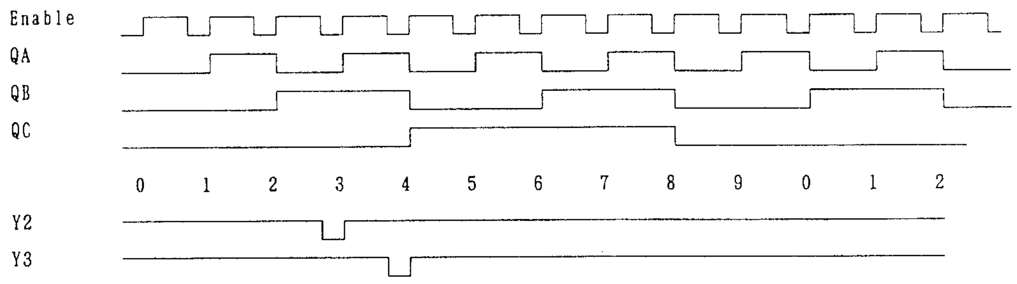


Fig. 2-2-45 Input/Output Timing Chart of Line Decoder (IC1) (Section 2-2-13. (1))

The select signal, reset signal, R/W timing signal, four address buses, and eight data buses on the SE-198 (SE-200) board are available as a signal line.

The SE-198 board mounts two address decoder blocks. One is address decoder 1 consisting of IC5 and IC8, and the other is address decoder 2 consisting of IC3. In address decoder 1, when an address bus (A4) is "High" level, the outport (IC12) is enabled and the low-order four bits of the data bus are sent to pin A of a data comparator (IC4). At that time, the data of a rotary switch (S1) is input to pin B of the comparator. When the two input values at pins A and B coincide, pin (A = B) of the comparator is set "High" level. The output signal is input to the enable pin of address decoder 2 (IC3). As a result, address decoder 2 that coincides with the bin number input from the CU-118 board and the bin number set in a rotary switch (S1) is enabled, and only the SE-198 board can access the CPU-118 board. Moreover, the input signal of address decoder 1 is enabled on another SE-198 board as well as this SE-198 board. Therefore, all the SE-198 boards to be connected can be sequentially accessed by changing the data of the bin number on the CPU-118 board.The address output signal decoded by address decoder 2 is sent an inport (IC6), D-type flip-flop circuits (IC15, IC17, and IC20), and IC8 to the enable pin of outports 1 and 2 (IC13 and IC18). The bin number, tape format (BETACAM, S-VHS, etc.), and bin sensor state are read or the bin lamp is turned on and off by accessing these addresses. When an L cassette is put in a shelf, data is input to a D-type flip-flop circuit (IC20). When a left S cassette is put in a shelf, data is input to a D-type flip-flop circuit (IC17). For a right S cassette, data is input to a D-type flip-flop circuit (IC15) and sent to the CPU-118 board.

(3) Bin lamp block (Refer to Fig. 2-2-44.)

Red LED lamps corresponding to the number of bin shelves are provided at the right and left ends on the front panel of a bin block. Therefore, five LED lamps are mounted each on the SE-198 and SE-199 boards, and four LED lamps are mounted each on the SE-200 and SE-201 boards. The left bin lamp is mounted on the SE-199 (SE-201) board, and the right bin lamp is mounted on the SE-198 (SE-200) board. These lamps are turned on and off (controlled) by the CPU-118 board.

(4) Address map (Refer to Table 2-2-15.)

The address map on the SE-198 (SE-200) board is shown in Table 2-2-15.

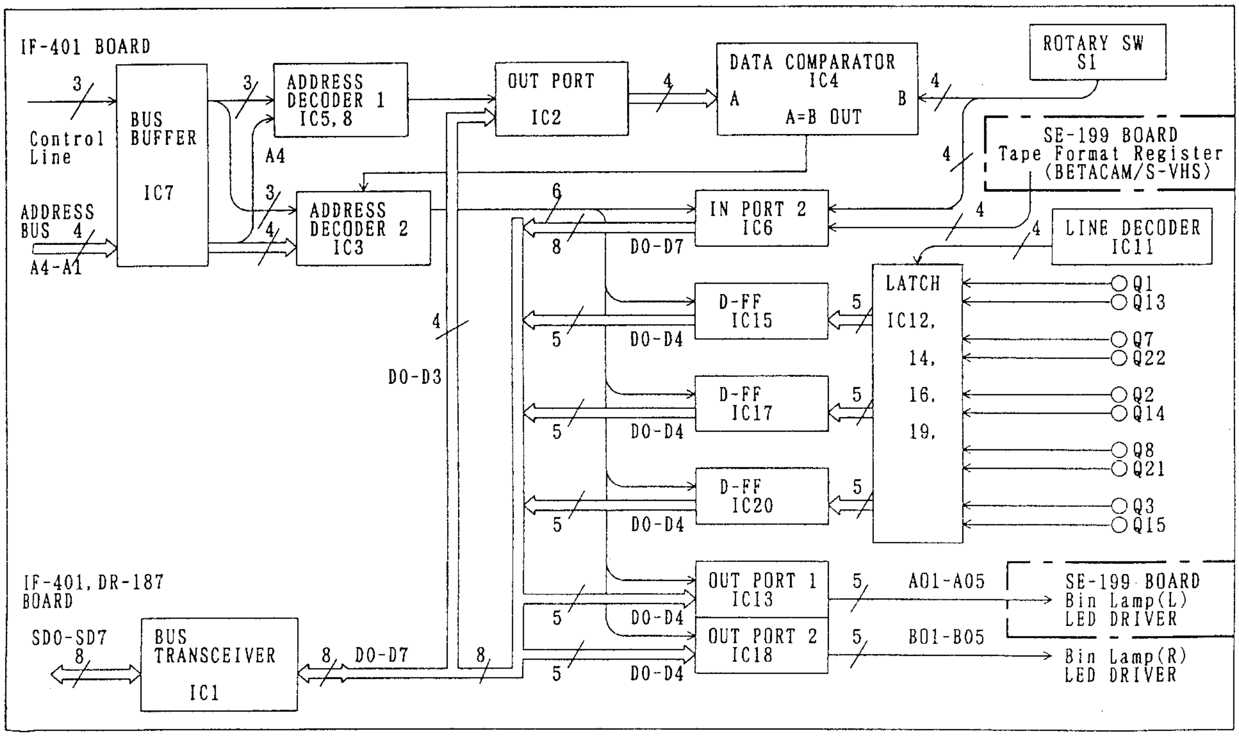

IF-401 BOARD
Control Line
3
ADDRESS BUS 4
A4-A1
BUS BUFFER
IC7
3
ADDRESS DECODER 1
IC5, 8
A4
3
4
ADDRESS DECODER 2
IC3
OUT PORT
IC2
4
DATA COMPARATOR
IC4
A
B
A=B OUT
4
ROTARY SW
S1
SE-199 BOARD
Tape Format Register
(BETACAM/S-VHS)
4
6
IN PORT 2
IC6
8
D0-D7
4
4
LINE DECODER
IC11
LATCH
IC12, 14, 16, 19,
Q1
Q13
Q7
Q22
Q2
Q14
Q8
Q21
Q3
Q15
4
D0-D3
D-FF
IC15
5
5
D0-D4
D-FF
IC17
5
5
D0-D4
D-FF
IC20
5
5
D0-D4
IF-401, DR-187
BOARD
SD0-SD7
8
BUS TRANSCEIVER
IC1
8
D0-D7
8
OUT PORT 1
IC13
5
D0-D4
5
A01-A05
OUT PORT 2
IC18
5
D0-D4
5
B01-B05
SE-199 BOARD
Bin Lamp(L)
LED DRIVER
Bin Lamp(R)
LED DRIVER

Fig. 2-2-46 Interface Block with CPU-118 Board (Section 2-2-13. (1) and (2))

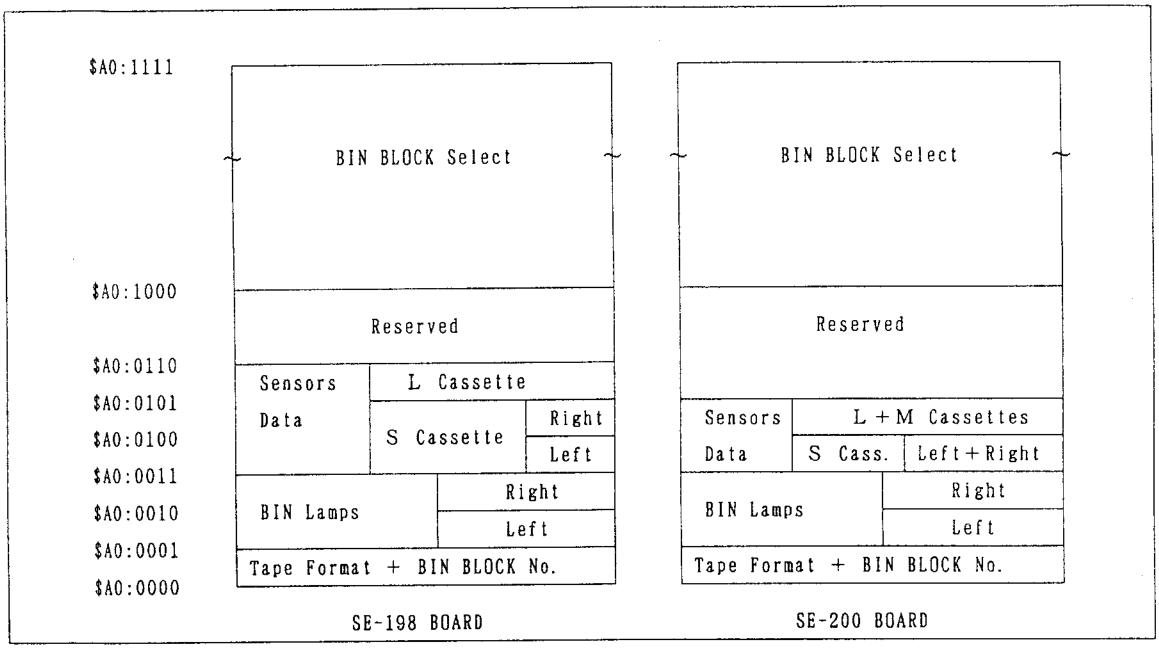

$A0:1111
$A0:1000
$A0:0110
$A0:0101
$A0:0100
$A0:0011
$A0:0010
$A0:0001
$A0:0000
BIN BLOCK Select
Reserved
Sensors Data
L Cassette
S Cassette
Right
Left
BIN Lamps
Right
Left
Tape Format + BIN BLOCK No.
SE-198 BOARD
BIN BLOCK Select
Reserved
Sensors Data
L + M Cassettes
S Cass.
Left + Right
BIN Lamps
Right
Left
Tape Format + BIN BLOCK No.
SE-200 BOARD

Table. 2-2-15 Address Map on SE-198 (SE-200) Board (Section 2-2-13. (4))

## 2-2-14. PS-330 Board

The power supply block consists of a power supply rectifier/regulator (PS-330) board, voltage selector (VS-49) board, transformers (A) and (B), line filter, and breaker. It is installed under the controller block on the rear panel.

The power is sent through an overcurrent prevention breaker and noise elimination line filter to the voltage selector (VS-49) board. The voltage selector (VS-49) board is connected to transformers (A) and (B) so as to select an input voltage. The input voltage corresponds to 100 V, 120 V, 220 V, 230 V, and 240 VAC. The taps on the primary winding of transformers (A) and (B) are switched by selecting connectors (CN2 to CN11) according to each input voltage.

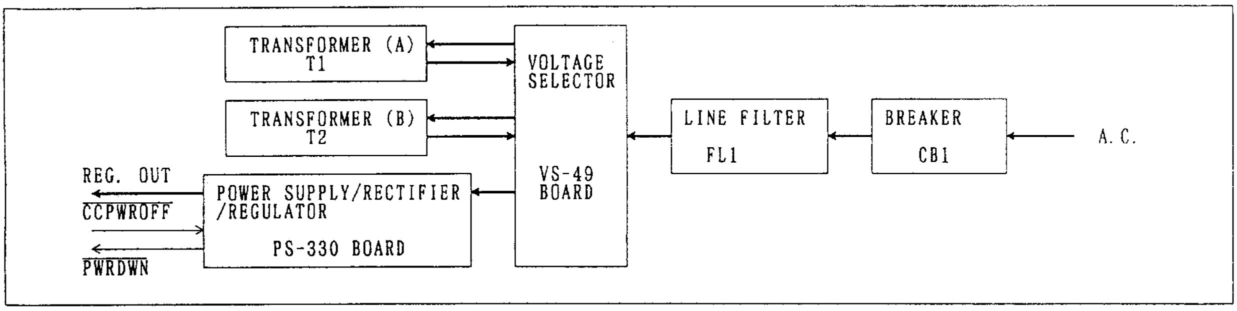

TRANSFORMER (A)
T1
TRANSFORMER (B)
T2
VOLTAGE SELECTOR
VS-49 BOARD
LINE FILTER
FL1
BREAKER
CB1
A. C.
REG. OUT
CCPWROFF
PWRDWN
POWER SUPPLY/RECTIFIER /REGULATOR
PS-330 BOARD

Fig. 2-2-47 Power Supply Block (Section 2-2-14.)

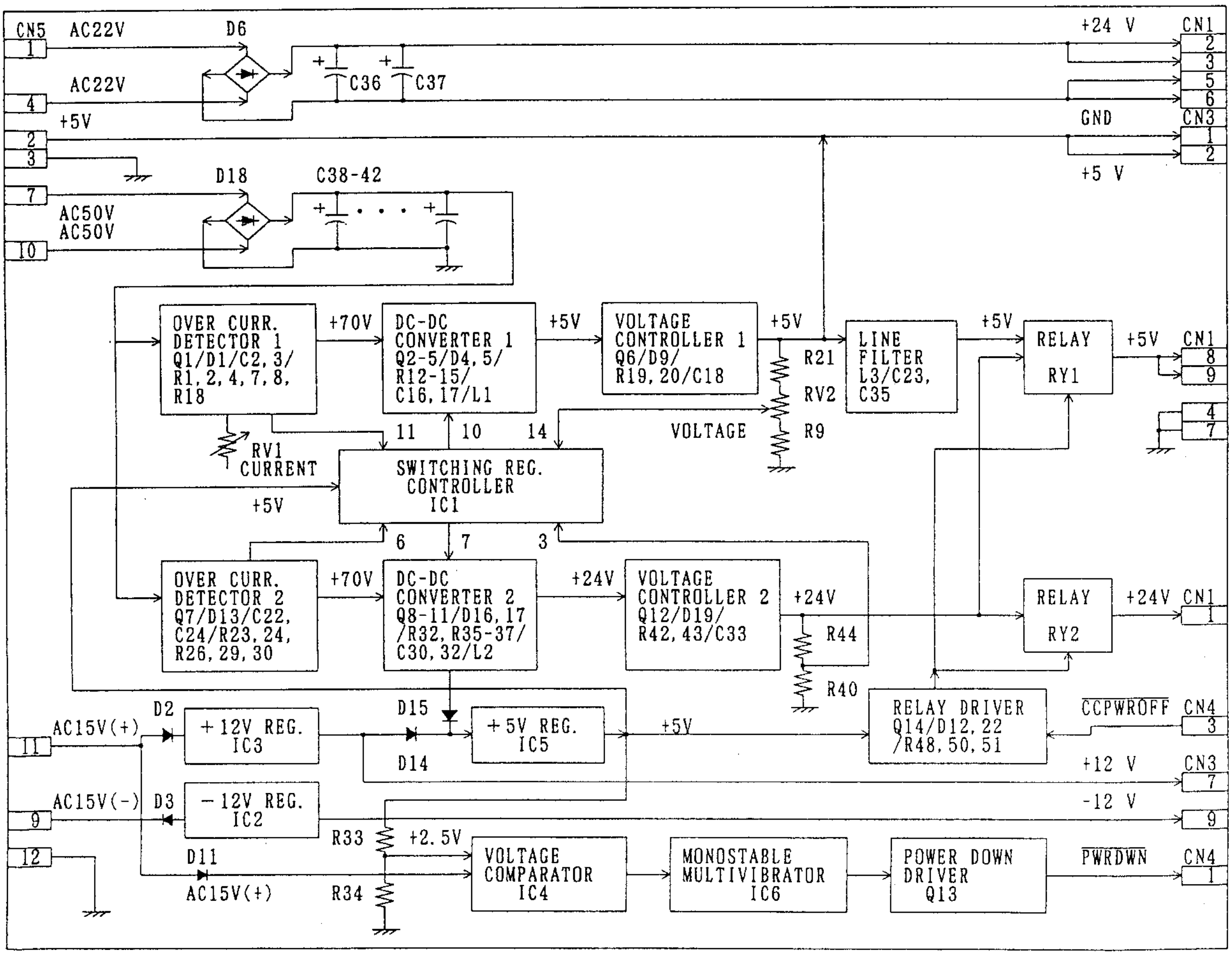

CN5
AC22V
AC22V
+5V
D6
C36
C37
+24 V
CN1
2
3
5
6
GND
CN3
1
2
+5 V
D18
C38-42
AC50V
AC50V
1
4
2
3
7
10
OVER CURR. DETECTOR 1 Q1/D1/C2, 3/ R1, 2, 4, 7, 8, R18
+70V
DC-DC CONVERTER 1 Q2-5/D4, 5/ R12-15/ C16, 17/L1
+5V
VOLTAGE CONTROLLER 1 Q6/D9/ R19, 20/C18
+5V
R21
RV2
R9
VOLTAGE
LINE FILTER L3/C23, C35
+5V
RELAY RY1
+5V
CN1
8
9
4
7
RV1 CURRENT
11
10
14
SWITCHING REG. CONTROLLER IC1
+5V
6
7
3
OVER CURR. DETECTOR 2 Q7/D13/C22, C24/R23, 24, R26, 29, 30
+70V
DC-DC CONVERTER 2 Q8-11/D16, 17 /R32, R35-37/ C30, 32/L2
+24V
VOLTAGE CONTROLLER 2 Q12/D19/ R42, 43/C33
+24V
R44
R40
RELAY RY2
+24V
CN1
1
D2
AC15V(+)
11
+12V REG. IC3
D15
D14
+5V REG. IC5
+5V
RELAY DRIVER Q14/D12, 22 /R48, 50, 51
CCPWROFF
CN4
3
+12 V
CN3
7
AC15V(-)
9
D3
-12V REG. IC2
-12 V
9
12
R33
+2.5V
D11
AC15V(+)
R34
VOLTAGE COMPARATOR IC4
MONOSTABLE MULTIVIBRATOR IC6
POWER DOWN DRIVER Q13
PWRDWN
CN4
1

Fig. 2-2-48 Power Supply Rectifier/Regulator Block (PS-330 Board) (Section 2-2-14. (1) to (4))

A voltage of 50/22/ ±15/10 VAC is output from the secondary winding of transformers (A) and (B). The output voltage is sent to the power supply rectifier/regulator (PS-330) board. The PS-330 board converts the AC voltage into a DC voltage by a switching regulator and produces a stable voltage of +24/+5 VDC. Fig. 2-2-47 shows the power supply block. The PS-330 board is described below.

(1) +24 V power for motor driving on DR-187 board (Refer to Fig. 2-2-48.)

A power of 22 VAC is rectified in full wave using D6, rectified using electrolytic capacitors, and output as a power of +24 VDC. The power is supplied to the DR-187 board and used to drive a Y motor.

(2) Main power of +5 V (Refer to Fig. 2-2-48.)

① Overcurrent detector block (Refer to Fig. 2-2-49.)

A power of 50 VAC is directly converted into a DC power using a full-wave rectifier (D18) and electrolytic capacitor and sent to overcurrent detector 1. The transistor (Q1)of overcurrent detector 1 is usually turned off. The voltage at the base of Q1 is determined by the current that flows through resistor R7 and resistors R18, R8, RV1. When an overcurrent flows, the voltage applied across the resistor (R7) increases. When this voltage increases, the voltage at the base of Q1 increases. When the base voltage exceeds the threshold level, Q1 is turned on and a current flows through resistors (R1 and R2). The voltage occurring in resistor R2 is input through D1 to pin 11 of a switching regulator controller (IC1). In IC1, a protection circuit is activated. A control signal is sent from pin 10 of IC1 to DC-DC converter 1 (Q2 to Q5), and a power output voltage of +5 V is cut off.

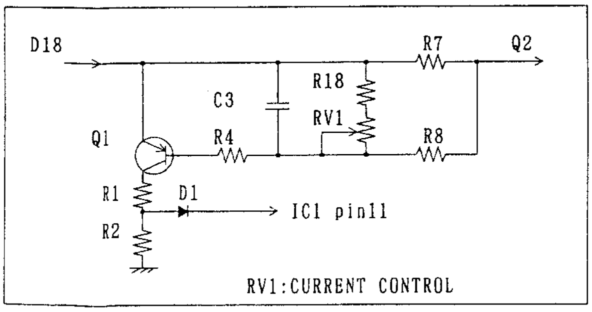


Fig. 2-2-49 Overcurrent Detector 1 (Section 2-2-14. (2))

② +5 V power

The output voltage of +70 V from an overcurrent detector circuit (Q1) is input to a DC-DC converter (Q2 to Q5), where the output voltage is converted into a voltage of +5 V DC using a PWM signal from pin 10 of switching regulator controller 1 (IC1). The +5 V output voltage of the converter branches into two paths and is sent to each board. When an excessive output voltage appears, an overvoltage protector (Q6) is activated to cut off the output voltage.
One of path is sent through the motherboard to the controller block and supplied for the power of each installed board. The other is sent to a line filter (L3, C23, and C35) to eliminate a noise, passed through a relay (RY1) controlled by the CPU-107 board, and sent to the DR-187 board. It is then supplied for the sensor power in the mechanical block.

(3) Main power of +24 V (Refer to Fig. 2-2-48.)

This system is the same in configuration as a main power circuit of +5 V (described in step (2)). The +24 V output voltage of a voltage control circuit (Q12) is passed through a relay (RY2) controlled by the CPU-107 board and sent to the DR-187 board.

(4) Power of ±12 V and power down detector circuit (Refer to Fig. 2-2-48.)

A power of +15 VAC input from the VS-49 board is rectified in half wave using D2, rectified using a +12 V regulator (IC3) and electrolytic capacitor, and output to a connector (CN3) as a power of +12 V. A power of −15 VAC is also rectified in half wave using D3, rectified using a −12 V regulator (IC2) and electrolytic capacitor, and output to a connector (CN3) as a power of −12 V.
An output power of +12 V is sent to the +5 V regulator (IC5) on the PS-330 board, and +5 V is output. The power from DC-DC converter 2 (Q8 to Q11) is also sent through D15 to the input pin of IC5. In a 5 V output power of IC5, the processing before power failure is performed while approximately 5 V is held for a while even if power failure occurs.
A 5 V output power of IC5 is voltage-divided by resistors (R33 and R34) and input to the non-inverting input pin as the reference voltage of a comparator (IC4). A power of +15 VAC is rectified in half wave and input to the inverting input pin of a comparator (IC4) as a power monitor signal. In IC4, this signal is compared with the reference voltage. When a decrease in the supply voltage is detected, a $\overline{\text{PWRDWN}}$ pulse is sent to the CPU-107 board using IC6 and Q13 to notify that the supply voltage decreased.

SONY - SP0061

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2013022

**SONY**

## MULTI CASSETTE SYSTEM

# FLEXICART

# SUPPLEMENT-3

**SUBJECT**
Addition and Replacement of Documents

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## APPLICABLE MANUALS/SERIAL NUMBERS

BFC-1 (UC, EK) MAINTENANCE MANUAL
1st Edition
1st Edition (Revised-1 to Revised-2)

Above manuals are packed with the following machines.

| | |
|---|---|
| BFC-1 (UC): | #10001 and higher |
| BFC-1 (EK): | #20001 and higher |

## MAINTENANCE MANUAL

BFC-1 (UC, EK)
9-967-470-08

Sony Corporation
Broadcast Products Company

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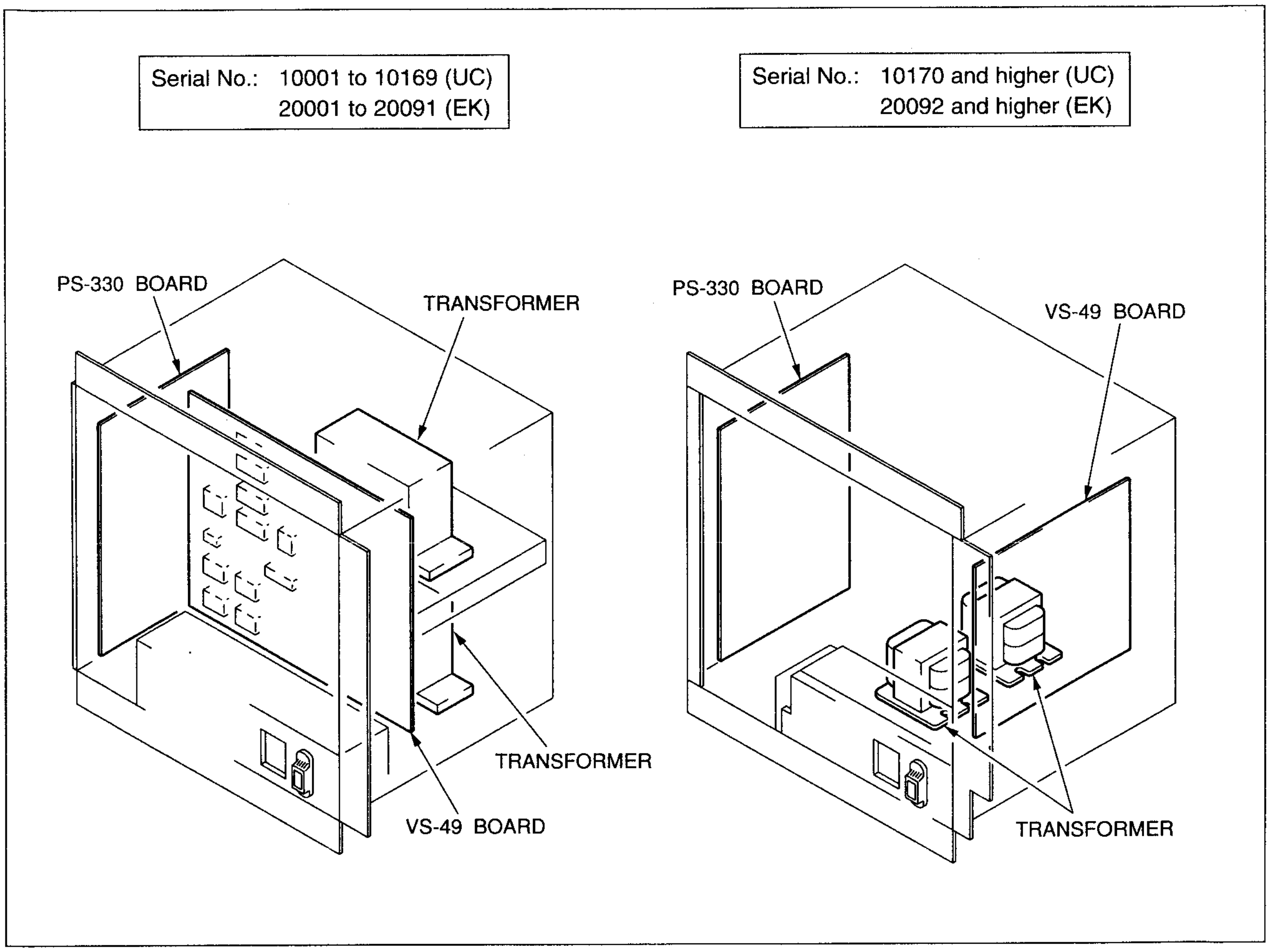
### 4-1-2. Power Supply Block


Serial No.: 10001 to 10169 (UC)
20001 to 20091 (EK)
Serial No.: 10170 and higher (UC)
20092 and higher (EK)
PS-330 BOARD
TRANSFORMER
TRANSFORMER
VS-49 BOARD
PS-330 BOARD
VS-49 BOARD
TRANSFORMER

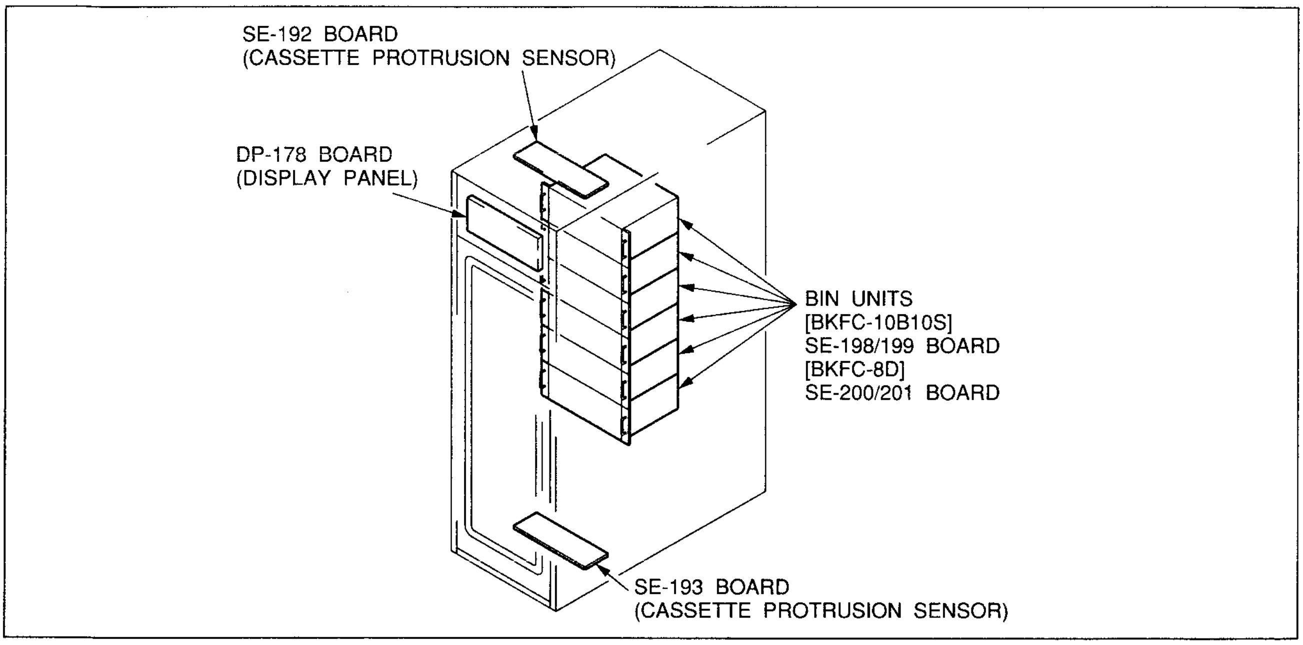
**VS-49 board**

This is used as an voltage selector board for selecting the voltage according to the power supply unit.
The VS-49 (UC) Mount substrate (for J, UC model) changes over the voltages of 100 V/120 V, and the VS-49 (EK) Mount substrate (for EK model) changes over the voltages of 220 V/230 V/240 V.

**PS-330 board**

This is used as an power supply board for making the specified DC voltage which is rectifying the AC voltage with fallen down at the transformer.

### 4-1-3. Sensor and Display Panel Block



**DP-178 board**

This is installed on the upper part of an front panel. This is used for displaying LEDs, interfacing some keys and controlling an speaker.

**SE-192 board**

This is used as protrusion sensor board (photo detector) for detecting lights with emitted from the SE-193 board.
When detecting anything to shut off between a sensor on the SE-192 board and that on the SE-193 board, the information is transmitted to the CPU-118 board via the IF-401 board.
When detecting any protrusion, an elevator might be attacked to the protrusion by moving the elevator. That is because the board always performs to watch and transmits to the CPU-118 board.

**SE-193 board**

This is used as a protrusion sensor board (photo emitter).

**[BKFC-10B/10S]**
**SE-198 board**

This is used as a bin cassette sensor board (photo detector).
Each of the BKFC-10B (for Betacam series) and BKFC-10S (for S-VHS series) has one SE-198 board.
This is detecting that a cassette is in or out of the bin and the cassette size by detecting lights with emitted from the SE-199 board.

**SE-199 board**

This is used as a bin cassette sensor board (photo emitter).
The SE-199 board is divided into the following two types by the difference of mounting jumper leads on the board.
SE-199A board:BKFC-10B (for Betacam series)
SE-199B board:BKFC-10S (for S-VHS series)
This is paired with the SE-198 board.

**[BKFC-8D]**
**SE-200 board**

This is used as a bin cassette sensor board (photo detector).
The BKFC-8D (for D-1 and D-2 series) has one SE-200 board.
This is detecting that a cassette is in or out of the bin and the cassette size by detecting lights with emitted from the SE-201 board.

**SE-201 board**

This is used as a bin cassette sensor board (photo emitter).
The BKFC-8D has one SE-201 board.
This is paired with the SE-200 board.

### 4-1-4. Elevator Drive Block

**CB-50 board**

This is used as the connection board of an Y drive motor harness.

**Note:** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no CB-50 board.

**Y drive motor assembly**

This is used as the motor for moving an elevator assembly to Y direction.

**Timing belt (S)**

This is used for transmitting the operating force from the Y drive motor to the timing belt (L).

**Timing belt (L)**

This is used for moving the elevator assembly and counter weight to Y direction by the operating force with transmitted from the timing belt (S).

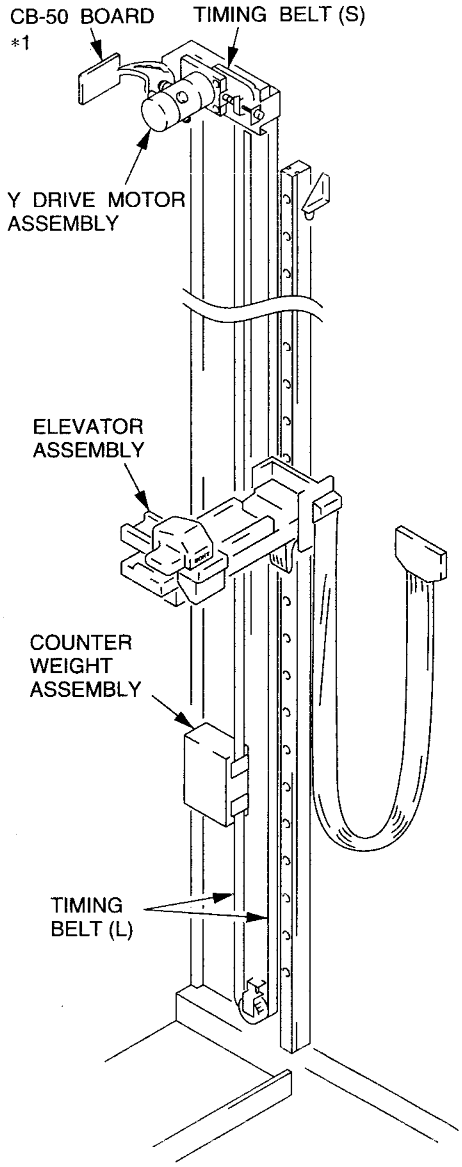
**Counter weight assembly**

This is used for stablizing the movement of the elevator assembly to Y direction.

The weight of it is almost the same as the elevator assembly.

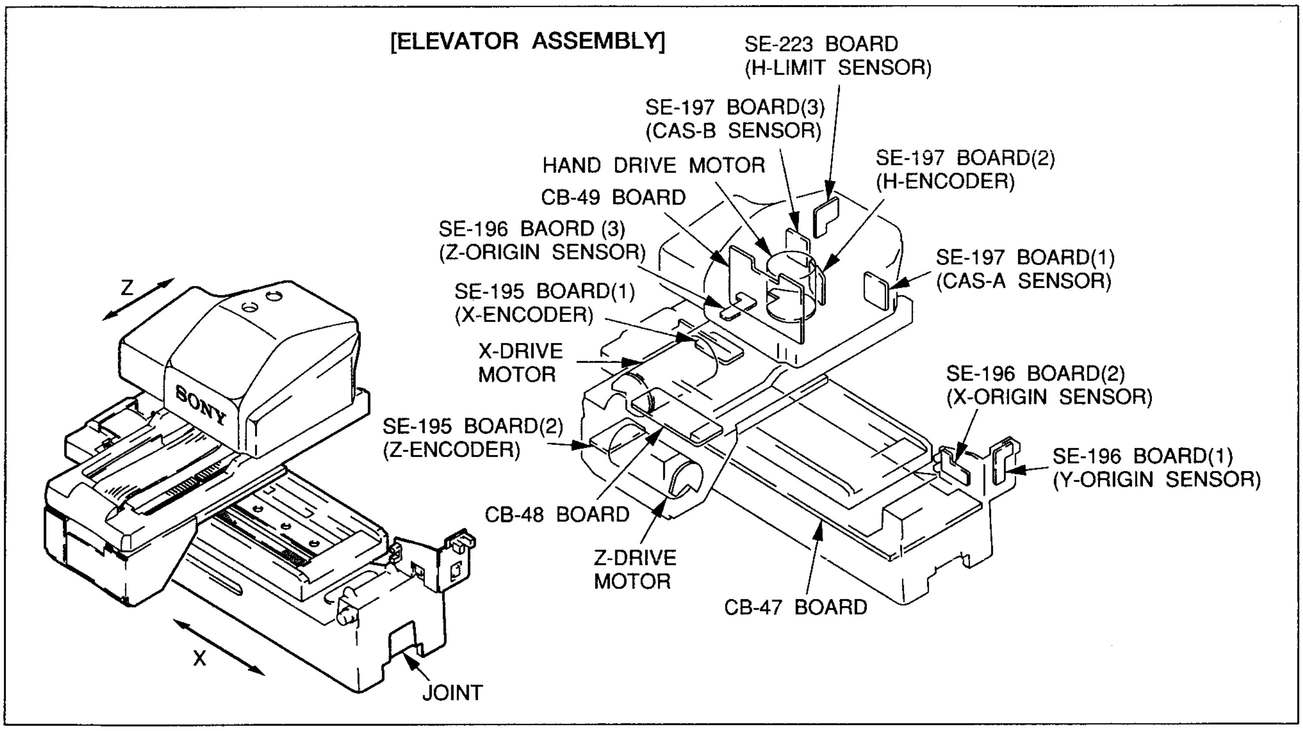
**Elevator assembly**

This is used for sending a cassette tape to a bin and VTR. (See section 4-1-5.)


CB-50 BOARD
*1
TIMING BELT (S)
Y DRIVE MOTOR ASSEMBLY
ELEVATOR ASSEMBLY
COUNTER WEIGHT ASSEMBLY
TIMING BELT (L)

*1: Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no CB-50 board.

### 4-1-5. Elevator Assembly


[ELEVATOR ASSEMBLY]
SE-223 BOARD
(H-LIMIT SENSOR)
SE-197 BOARD(3)
(CAS-B SENSOR)
HAND DRIVE MOTOR
SE-197 BOARD(2)
(H-ENCODER)
CB-49 BOARD
SE-196 BAORD (3)
(Z-ORIGIN SENSOR)
SE-197 BOARD(1)
(CAS-A SENSOR)
Z
SE-195 BOARD(1)
(X-ENCODER)
X-DRIVE
MOTOR
SE-196 BOARD(2)
(X-ORIGIN SENSOR)
SE-195 BOARD(2)
(Z-ENCODER)
SE-196 BOARD(1)
(Y-ORIGIN SENSOR)
CB-48 BOARD
Z-DRIVE
MOTOR
CB-47 BOARD
X
JOINT

Elevator assembly consists of the following three blocks.

- X stage block
- Z stage block
- Hand block

This section describes the function of the components of each block.

**[X stage block]**

**SE-196 board (1)**

This is used as a shutter plate sensor, which has one photo interrupter.

This is specifying the Y-origin, the location of a bin and VTR.

**SE-196 board (2)**

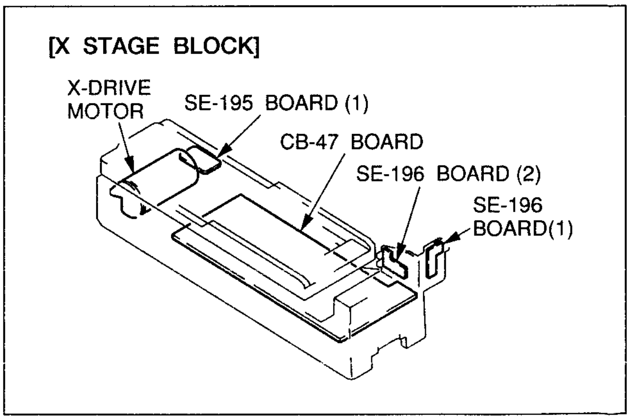
This is used as a X-origin sensor, which has one photo interrupter.

This is detecting the X-origin of the elevator assembly.

**CB-47 board**

This is used for connecting the signal from the DR-187 and IF-401 boards to the elevator assembly.

LEDs on the board indicate the conditions of sensors, encoders on the elevator stages and hands and barcord reader.


[X STAGE BLOCK]
X-DRIVE
MOTOR
SE-195 BOARD (1)
CB-47 BOARD
SE-196 BOARD (2)
SE-196
BOARD(1)

**SE-195 board (1)**

This is used as an X encoder, which has two photo interrupters.

This is installed on the encoder for detecting the location of the X stage on the elevator assembly.

**X drive motor**

This is used as the motor for moving the hand block on the elevator assembly to X direction.

**[Z stage block]**

**CB-48 board**

This is used as a connection board in the Z stage on the elevator assembly.

**SE-195 board (2)**

This is used as a Z encoder, which has two photo interrupters.

This is installed on the encoder for detecting the location of the Z stage on the elevator assembly.

**SE-196 board (3)**

This is used as a Z-origin sensor, which has one photo interrupter.

This is detecting the Z-origin of the elevator assembly.

**Z drive motor**

This is used as a motor for moving the hand block on the elevator assembly to Z direction.

**[Hand block]**

**SE-197 board (1)**

This is used for detecting the right part of a cassette shell is in or out, when the hand take the cassette tape. This has one photo interrupter.

When both of SE-197 (1) and SE-197 (3) boards are shut off, the hand take the cassette tape.

**SE-197 board (2)**

This is used as a H encoder for specifying the opening amount of fingers on the hand, which has one photo interrupter.

This measures the opening amount as the origin which is the position that the fingers on the hand are closed completely.

**SE-197 board (3)**

This is used as a CAS-B sensor for detecting the left part of a cassette shell is in or out, when the hand take the cassette tape.

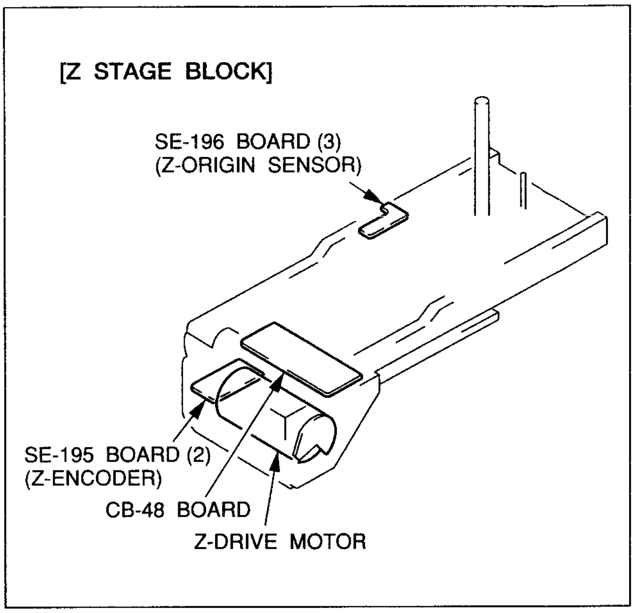
This has one photo interrupter.

When both of SE-197 (1) and SE-197 board (3) boards are shut off, the hand take the cassette tape.

**SE-223 board**

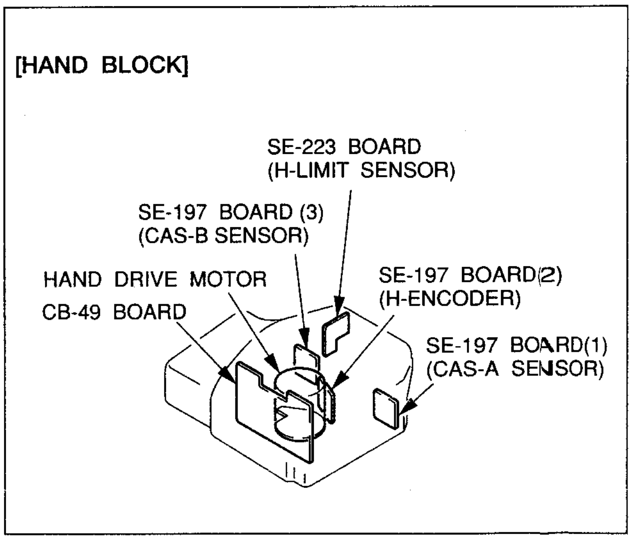
This is used as a H limit sensor for detecting the maximum amount of fingers on the hand, which has one photo interrupter.

When this sensor is shut off, the fingers on the hand do not open any more.



[Z STAGE BLOCK]

SE-196 BOARD (3)
(Z-ORIGIN SENSOR)
SE-195 BOARD (2)
(Z-ENCODER)
CB-48 BOARD
Z-DRIVE MOTOR



[HAND BLOCK]

SE-223 BOARD
(H-LIMIT SENSOR)
SE-197 BOARD (3)
(CAS-B SENSOR)
HAND DRIVE MOTOR
CB-49 BOARD
SE-197 BOARD(2)
(H-ENCODER)
SE-197 BOARD(1)
(CAS-A SENSOR)

**CB-49 board**

This is used as a connection board in the hand on the elevator assembly.

**Hand drive motor**

This is used as a motor for moving the hand block in the elevator assembly.

## 4-2. HOW TO OPEN AND SHUT FRONT DOOR

To prevent a cart machine from being dangerous and protect components in the console, the structure of this machine is that the front door can be opened only when performing the following procedures.

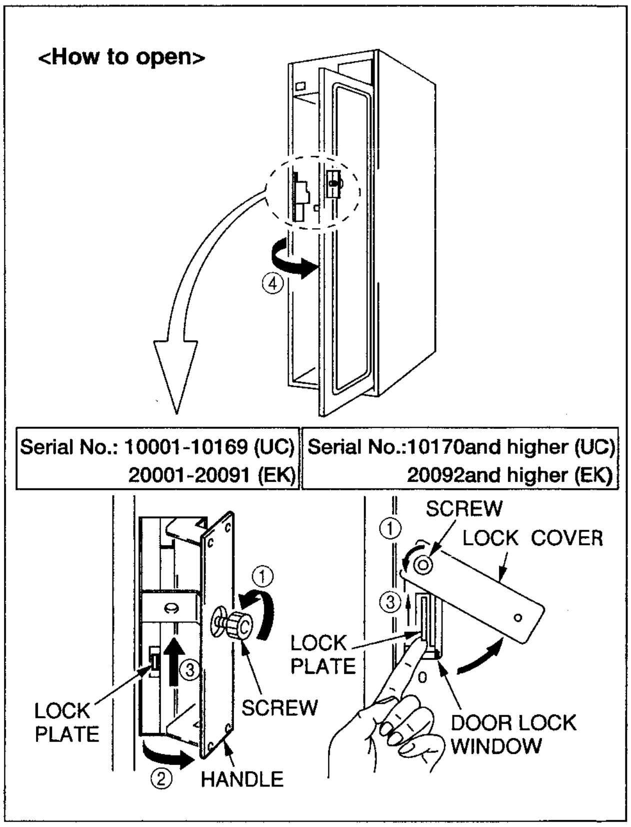
**Note:** 1. When unpacking, open and shut the front door with turning off the power. When the power is on, the elevator assembly might be damaged by the shipping plate with fixing the elevator assembly during carrying.

2. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have some parts whose shapes differ.

### 4-2-1. How to Open and Shut Front Door When Power Is Off

**<How to open>**

1. Loosen the screw as shown in the figure counterclockwise (in the direction of arrow ①) by using a hexagon wrench driver.
   Hexagon wrench driver: 3 mm
   **Note:** The screw cannot be removed, because a screw stopper is attached.
2. Open the handle by hand (In the direction of arrow ②). Otherwise, slide the lock cover by hand.
3. Lift the lock plate up by hand in the direction of arrow ③.
4. Hold the handle or door lock window, and pull the door in the direction of arrow ④.



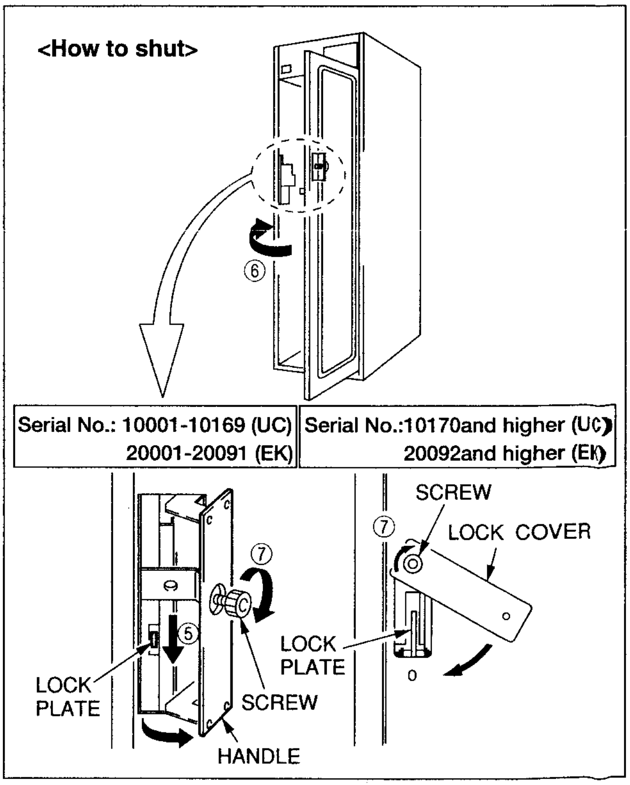
<How to open>
④
Serial No.: 10001-10169 (UC) 20001-20091 (EK)
Serial No.:10170and higher (UC) 20092and higher (EK)
①
③
LOCK PLATE
SCREW
②
HANDLE
①
SCREW
LOCK COVER
③
LOCK PLATE
DOOR LOCK WINDOW

**<How to shut>**

1. Pull down the lock plate by hand in the direction of arrow ⑤.

**Note:** The lock plate drops automatically at the cart machine of the serial No. as follows.
UC : 10139 and higher
EK : 20048 and higher

2. Hold the handle or door lock window, and press the door in the direction of arrow ⑥.
3. Shut the handle or lock cover, and tighten the screw clockwise (in the direction of arrow ⑦).

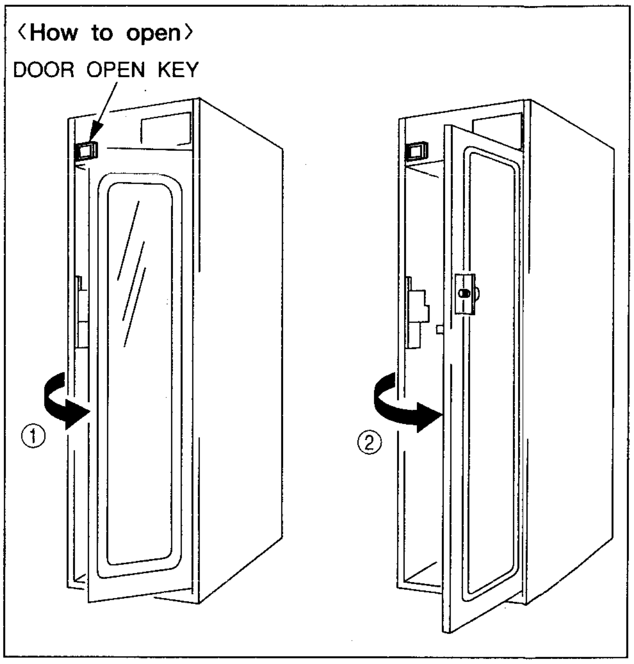


<How to shut>
⑥
Serial No.: 10001-10169 (UC) 20001-20091 (EK)
Serial No.:10170and higher (UC) 20092and higher (EK)
⑦
⑤
LOCK PLATE
SCREW
HANDLE
⑦
SCREW
LOCK COVER
LOCK PLATE

### 4-2-2. How to Open and Shut Front Door When Power Is On

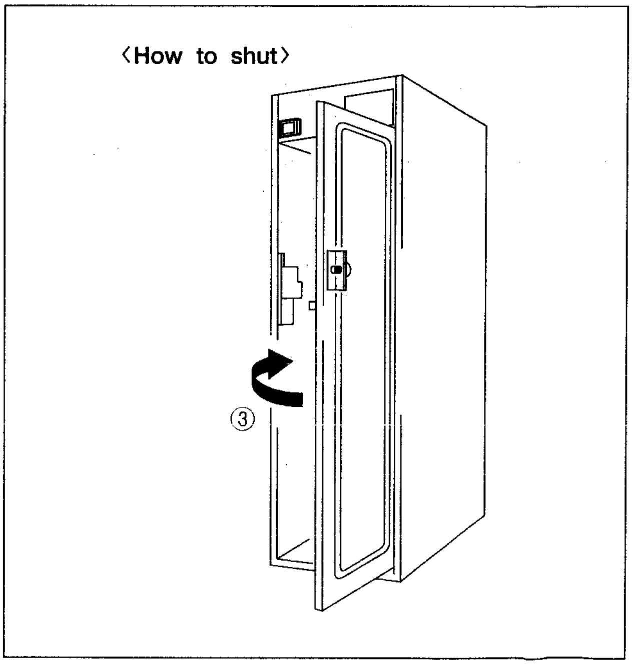
**<How to open>**

1. Press the DOOR OPEN key.
   DOOR OPN is displayed on the display panel, and turned on. The elevator assembly automatically goes up to the highest position simultaneously. Then, the door lock is released and the door is opened about 5 cm in the direction of arrow ①.
2. Pull the door in the direction of arrow ② by hand.



**<How to shut>**

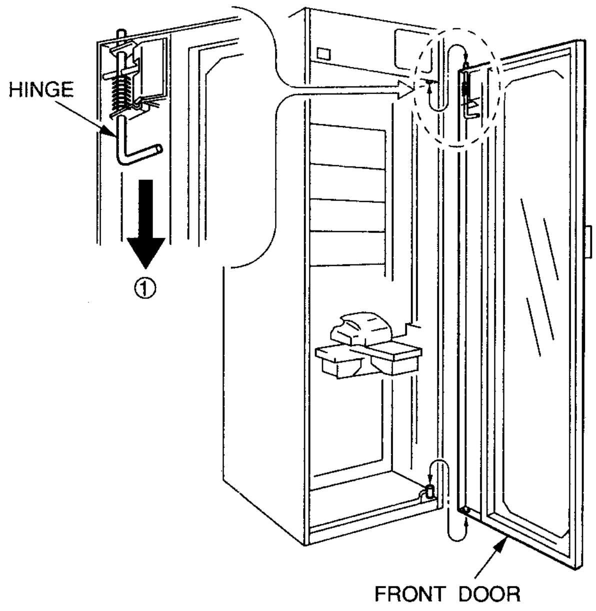
Press the door in the direction of arrow ③.
The door is automatically locked. The elevator assembly stays at the highest position until the next cassette conveyance.



## 4-3. HOW TO REMOVE CABINETS

### 4-3-1. How to Remove Front Door

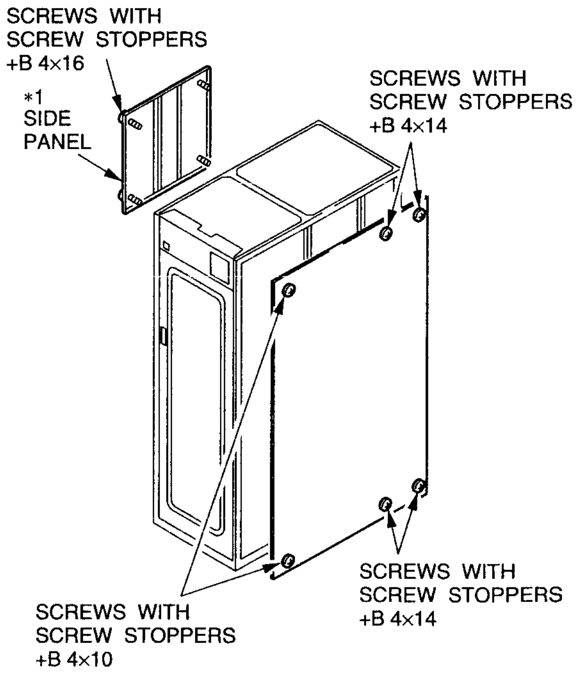
1. Open the front door as described at section 4-2, "How to Open and Shut Front Door".
2. Pull down the hinge on the upper part of the door in the direction of arrow ①. Remove the door from the hinge on the lower part of the door with holding the door.


HINGE
①
FRONT DOOR

### 4-3-2. How to Remove Side Panels

Remove the screws from the side panels as shown in the figure, and remove the side panels.

**Note:** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no *1: side panel (left).


SCREWS WITH SCREW STOPPERS +B 4×16
*1 SIDE PANEL
SCREWS WITH SCREW STOPPERS +B 4×14
SCREWS WITH SCREW STOPPERS +B 4×14
SCREWS WITH SCREW STOPPERS +B 4×10

## 4-4. HOW TO SET VOLTAGE SELECTOR AND NOTES

When the cart machine is shipped, the voltage selector is set according to the destination local power supply unit voltage.
However, the voltage value is different according to the destination.
The following voltages can be set by the voltage selector.
**VS-49 board (UC) (for J, UC model) :**
AC100V /120V
**VS-49 board (EK) (for EK model) :**
AC220V /230V /240V
Before turning on the power, check the setting of the voltage selector.

**[How to set voltage selector]**
The voltage selector is installed on the VS-49 board in the power supply unit.
**Note:** The installation location of the VS-49 board differs according to the serial number segments below.
*1 UC: 10001 to 10169
EK: 20001 to 10091
*2 UC: 10170 and higher
EK: 20092 and higher

1. How to remove power panel
   Remove the four screws, and remove the power panel as shown in the figure.

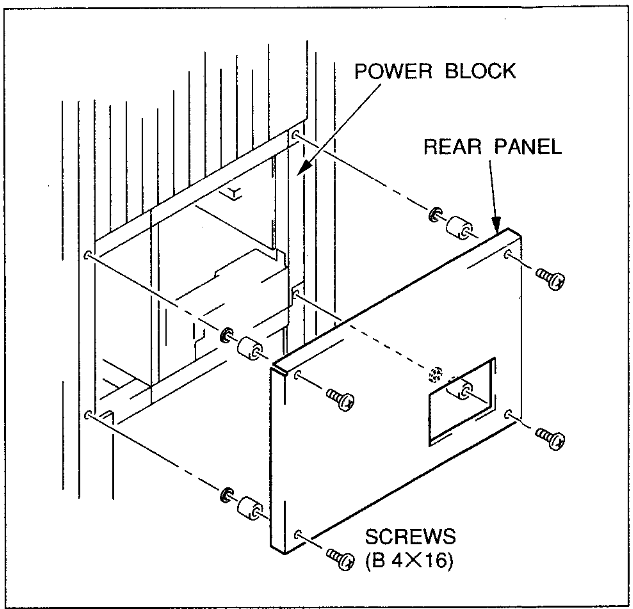
2. How to set voltage selector
   Connect connectors CN T1 (white) and CN T2 (brown) of harnesses to CN2 through CN6 (white) and CN7 through CN11 (brown) on the VS-49 board respectively. The destinations of connectors are as follows:

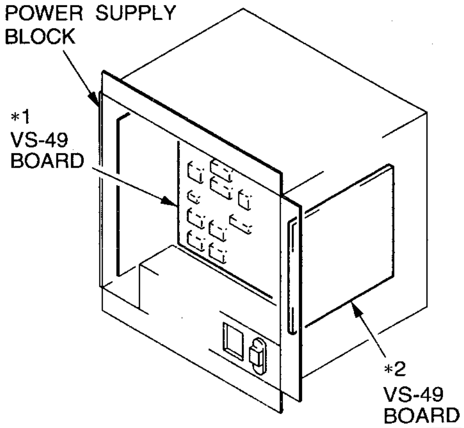
| Input Voltage (V AC) | VS-49 board (UC) CN No. | CN No. |
|---|---|---|
| 100V | CN2 | CN7 |
| 120V | CN3 | CN8 |

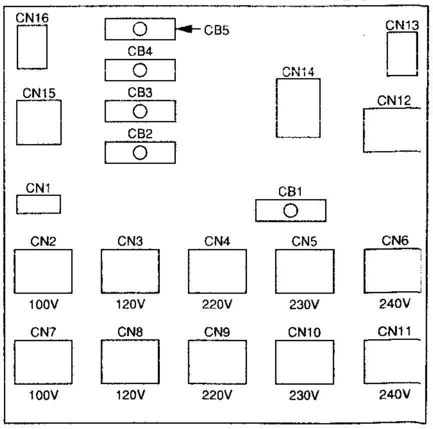
| Input Voltage (V AC) | VS-49 board (EK) CN No. | CN No. |
|---|---|---|
| 220V | CN4 | CN9 |
| 230V | CN5 | CN10 |
| 240V | CN6 | CN11 |

Harness connector CN T1 ↑ (CN No. column 1)

Harness connector CN T2 ↑ (CN No. column 2)


POWER BLOCK
REAR PANEL
SCREWS
(B 4X16)


POWER SUPPLY
BLOCK
*1
VS-49
BOARD
*2
VS-49
BOARD


CN16
CB5
CN13
CB4
CN14
CN15
CB3
CN12
CB2
CN1
CB1
CN2
CN3
CN4
CN5
CN6
100V
120V
220V
230V
240V
CN7
CN8
CN9
CN10
CN11
100V
120V
220V
230V
240V

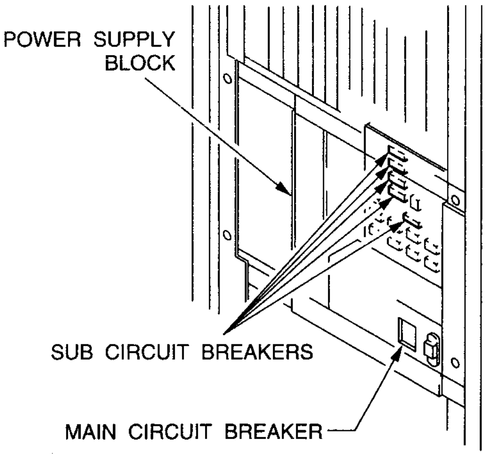
VS-49 BOARD

**Note:** The voltage selectors is mounted as follows.
CN2, 3, 7, 8 : J/UC model only
CN4 to 6, CN9 to 11: EK model only

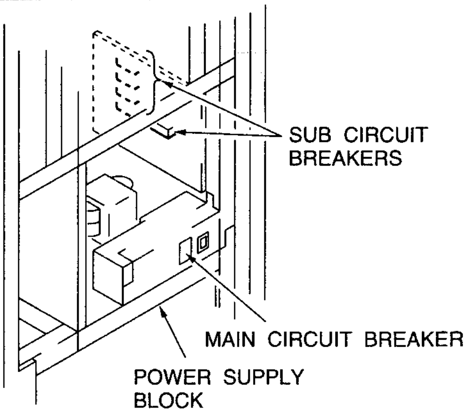
## 4-5. NOTES ON CIRCUIT BREAKERS

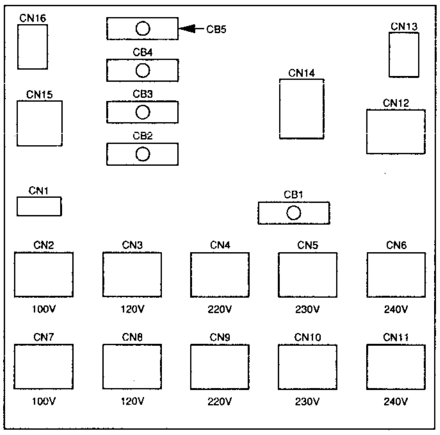
Circuit breakers of this cart machine are the two types, main and sub.
The main one is installed on the left of the AC inlet.
The sub ones (five) are installed on the VS-49 board (CB1 through CB5).
The main circuit breakers are always to ON (Lever is lifted).
Check the cause of generation when the breaker is set to OFF (state in which the lever is in the lower position) by cutoff of the excess current.
Eliminate the cause and then move the lever up.
The sub circuit breakers are always set to IN (White or green bits are pushed in).
When they are set to OUT (the bits are pushed out) by interrupting overcurrent, inspect the cause.
After including and clearing up the cause, push in the bits.

**Serial No. :10001 to 10169 (UC)**
**20001 to 20091 (EK)**


POWER SUPPLY BLOCK
SUB CIRCUIT BREAKERS
MAIN CIRCUIT BREAKER

**Serial No. :10170 and higher (UC)**
**20092 and higher (EK)**


SUB CIRCUIT BREAKERS
MAIN CIRCUIT BREAKER
POWER SUPPLY BLOCK


CN16
CB5
CB4
CN13
CN14
CN15
CB3
CN12
CB2
CN1
CB1
CN2
CN3
CN4
CN5
CN6
100V
120V
220V
230V
240V
CN7
CN8
CN9
CN10
CN11
100V
120V
220V
230V
240V

VS-49 BOARD

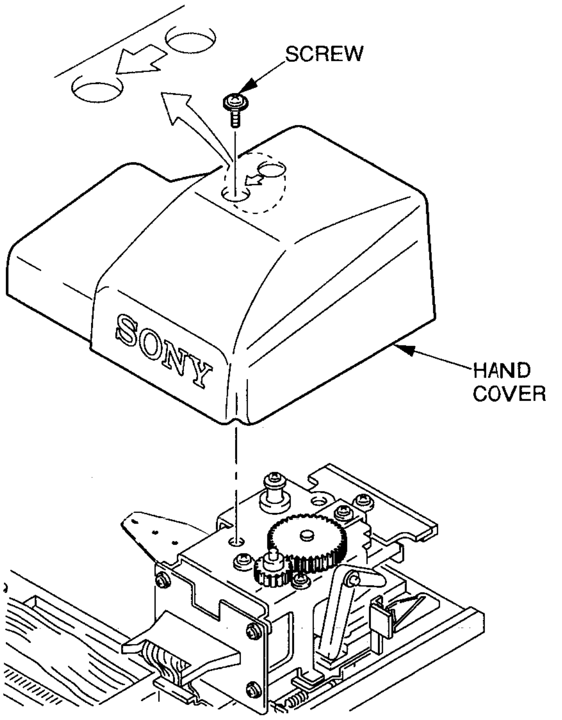
**Note:** The voltage selectors is mounted as follows.
CN2, 3, 7, 8 : J/UC model only
CN4 to 6, CN9 to 11: EK model only

### 4-7-2. How to Repair Finger Plate

When the SE-223 board on the hand block (H limit sensor) is out of order (Error message: ELV-0032) or the upper finger plate is overopened by hand, the finger plate might not be shut. When it cannot be shut, perform as follows:

1. Open the front door.
   See section 4-2.

2. Remove the hand cover.
   Remove one screw, and remove the hand cover.
   When removing the screw, be careful not to fall it in the console.



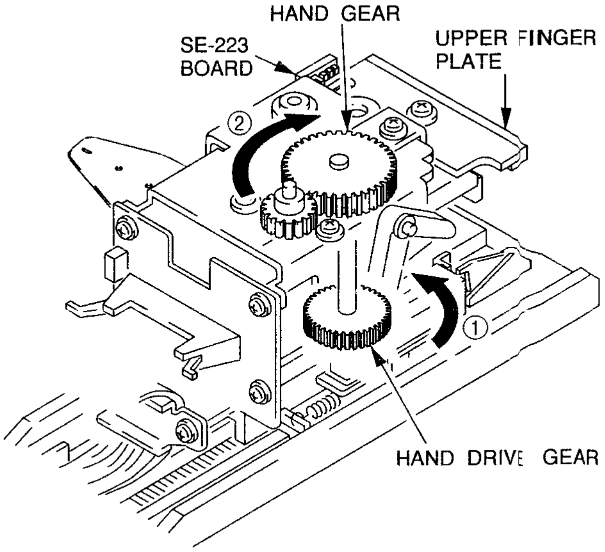
3. Rotate the hand drive gear counterclockwise (in the direction of arrow ①) by hand. Rotate it until the hand gear and the hand drive gear starts rotating simultaneously.

4. Rotate the hand gear clockwise (in the direction of arrow ②) a few turns.

5. Install the hand cover.

6. Shut the front door.
   See section 4-6-3.

7. When the SE-223 board is out of order or the finger plate cannot be shut again, the SE-223 board might be out of order. Replace the SE-223 board to a new one.



## 4-8. HOW TO INSPECT INSIDE CART MACHINE

1. How to inspect inside the cart machine usually
   ① Press the DOOR OPEN key.
   ② Open the front door.
   ③ Turn off the power of the cart machine.
   If necessary, fix the counter weight. (See section 9-1-2.)
   ④ Inspect inside the cart machine.
   ⑤ After inspecting, turn on the power.
   ⑥ Shut the front door.

2. When inspecting the following blocks
   - Elevator assembly inspection (Ⓐ)
   - Bin unit inspection (Ⓑ)
   - VTR inspection (Ⓒ)

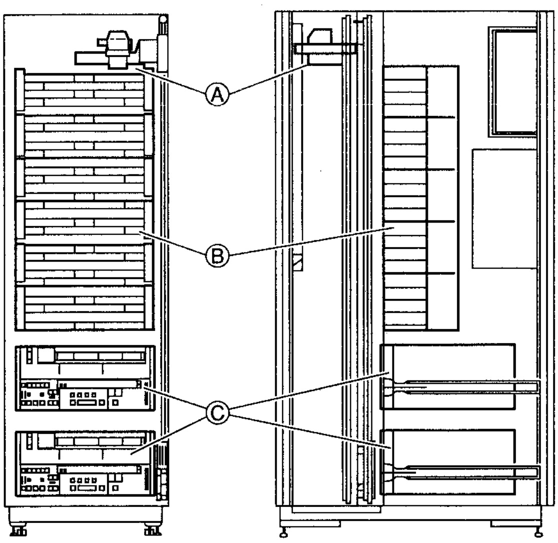
   ① Press the DOOR OPEN key.
   ② Open the front door.
   ③ Inspect each block.
   - Elevator assembly inspection
     Move the elevator assembly to the position where you can inspect easilly by hand.
     The elevator assembly can be moved by hand to X, Y and Z directions.
     Operation checks of sensors with installed on the elevator stage and elevator assembly.

     **[When inspecting with removing the elevator assembly]**
     Turn off the main power of the cart machine and remove the elevator assembly.
     **Note:** When removing the elevator assembly stays at other position than the highest position (the counter weight stays at the lowest position), the counter weight falls immediately and it might be out of order. When removing the elevator assembly stays at other position than the highest position, be sure to hold the counter weight. (See section 9-1-2.)

   - Bin unit inspection

   - VTR inspection

   ④ After inspecting, shut the front door.



Ⓐ : ELEVATOR ASSEMBLY

Ⓑ : BIN UNITS

Ⓒ : VTRS

## 4-13. HOW TO SERVICE VTR

1. How to service VTR with installed in cart machine

   **Notes: 1.** After turning off the main power of the cart machine, perform service.
   When servicing it in the condition of turning on the main power, disconnect the RS-422A connector on VTR.

   **2.** When pulling out the VTR, be sure to pull one VTR each.
   Especially, when two or more VTRs with installed from the rear side are pulled out simultaneously, the cart machine lose its balance and it might be fallen to the ground.
   To prevent such danger, we recommend for the cart machine to fix to the ground.
   See the installation manual for details of fixing.

   **3.** When pulling out the VTR with operating an application soft, be sure to forbit the VTR with pulled out by setup at the application side, and pull out it.

① Loosen the two VTR fixing screws.

② Pull out the VTR and service it.

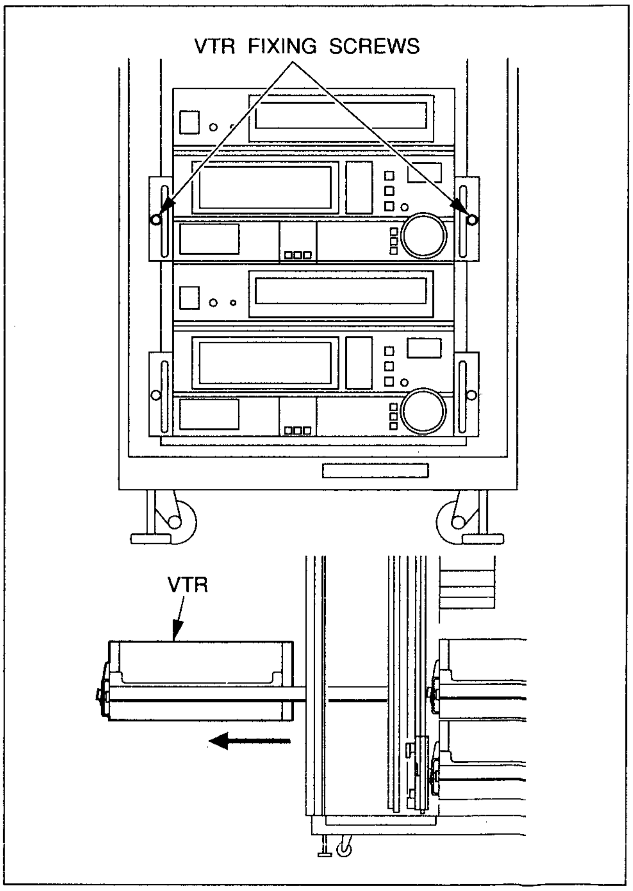
2. How to Service VTR without installed in cart machine

   **Notes: 1.** After turning off the main power of the cart machine, perform service.
   When servicing it in the condition of turning on the main power, disconnect the RS-422A connector on VTR.

   **2.** When pulling out the VTR, be sure to perform by two or more persons. When pulling out it, be sure to pull one VTR each.

   **3.** When pulling out the VTR with operating an application soft, be sure to forbit the VTR with pulled out by setup at the application side, and pull out it.

① Turn off the power of the VTR.
② Disconnect all cables with connected to VTRs.
③ Loosen the two VTR fixing screws.
④ Pull out the VTR, and remove it from the rack mount rails.
⑤ Service the VTR.



**How to Service VTR**

## 4-14. HOW TO SERVICE BIN UNIT

**Note:** After turning off the main power of the cart machine, perform servicing.

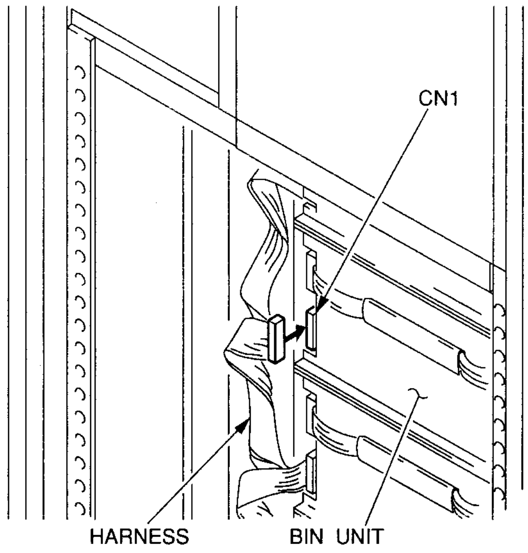
The service of the bin unit is performed with removing it from the cart machine.

① Disconnect connector CN1 of the bin unit with serviced from the rear side.
For Betacam and S-VHS series:
Connector CN1 on the SE-198 board
For D-1 and D-2 series:
Connector CN1 on the SE-200 board

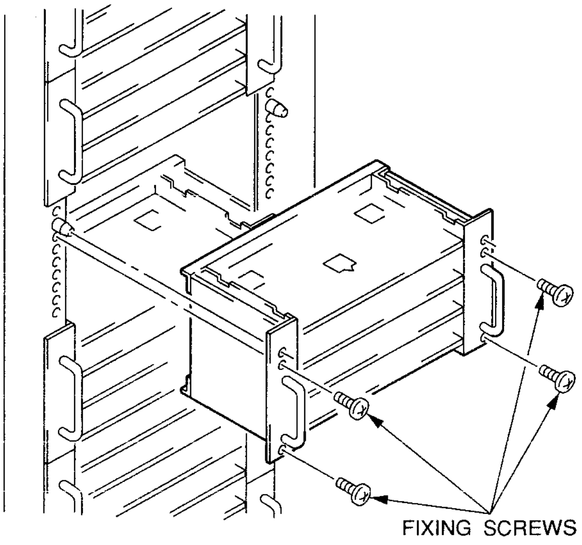
② When disconnecting the connectors on the upper three blocks of all blocks on the bin unit, remove the power panel of the power supply unit.

③ Remove the four bin fixing screws.

④ Remove the bin unit.



⟨How to Disconnect Connector CN1⟩



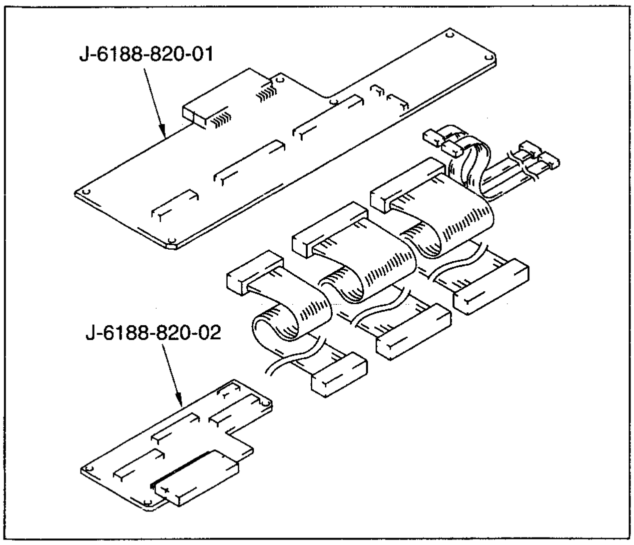
⟨How to Remove BIN UNIT⟩

**How to Service Bin Unit**

## 4-17. MAINTENANCE TOOLS AND EQUIPMENTS

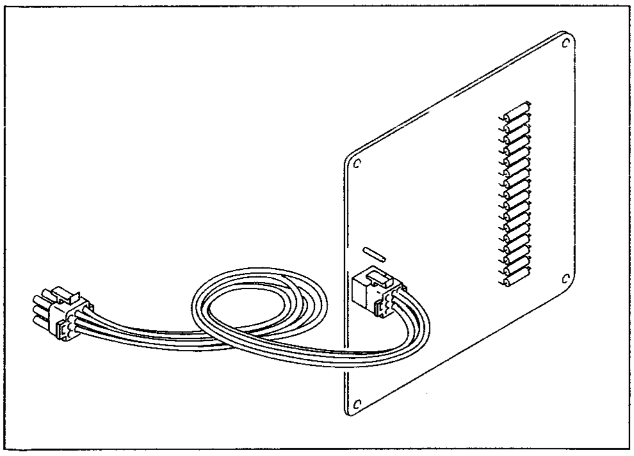
**[Tools]**

1. Hexagon wrench driver: 1.5 mm
2. Hexagon wrench driver: 2.5 mm
3. Hexagon wrench driver: 3.0 mm
4. Phillips screwdriver: M 2.6
5. Phillips screwdriver: M 3 through M 5
6. Flatblade screwdriver: 7 mm
7. Spanner for N3: 5.3 mm
8. Monkey wrench
9. Extension board EX-362 (One is supplied): Sony Part No. A-8276-527-A
10. Extension board (for DR-187 board) (JS-882): Sony Part No. J-6188-820-01/J-6188-820-02



**Extension Board (for DR-187 Board)**

11. Power supply adjustment tool (JS-857): Sony Part No. J-6188-570-A



**Power Supply Adjustment Tool**

12. Cleaning Piece: Sony Part No. 2-034-697-00
13. Cleaning Fluid: Sony Part No. 9-919-573-00
14. Screw Locking Compound: Sony Part No. 7-432-114-11

**[Equipment]**

1. Oscilloscope
2. Digital voltmeter

## 4-18. OPTIONAL KITS AND RECOMMENDED EQUIPMENTS

**<Bin unit>**
BKFC-8D : For D-1 and D-2 series
BKFC-10B: For Betacam series
BKFC-10S: For S-VHS series

**<Rack mount kit>**
BKFC-51: For DVR-2000/2100 series
DVR-18/28 series
BKFC-52: For DVR-10/20 series
BKFC-53: For BVW-60/65/70/75 series
SVO-9600 series

**<VTR interface>**
BKFC-100: VTR I/F board with RS-422A serial communication port

**<VTR in the cart machine>**
Betacam SP VTR: BVW-75/70/65/60
BVW-D75/D265
BVW-75P/70P/65P/60P
BVW-75S/70S
BVW-D75PS
BVW-75PM/65PM
PVW-2600/2800
PVW-2600P/2800P
Composite digital VTR (D-2):
DVR-20/10
DVR-28/18
DVR-20P/10P
DVR-28P/18P
Component digital VTR (D-1):
DVR-2000/2100
S-VHS VTR: SVO-9600/SVP-9000
SVO-9620/SVP-9020
(The RS-422A board and the time code board rerequired.)

**<Barcode reader unit>**
BKFC-200 : BARCODE READER UNIT

**Digital system**

**<Audio AD/DA>**
DAD-A210 : AUDIO AD/DA UNIT
BKDA-A211: ANALOG AUDIO INPUT BOARD
BKDA-A212: ANALOG AUDIO OUTPUT BOARD

**<Audio switcher>**
DSU-A210 : DIGITAL AUDIO SWITCHER UNIT
BKDS-A211 : DIGITAL AUDIO INPUT BOARD
BKDS-A212 : DIGITAL AUDIO OUTPUT BOARD

**<Video switcher>**
DSU-V210 : DIGITAL VIDEO SWITCHER UNIT
BKDS-V211 : DIGITAL VIDEO INPUT BOARD
BKDS-V212 : DIGITAL VIDEO OUTPUT BOARD
BKDS-V213 : ANALOG VIDEO INPUT BOARD
BKDS-V214 : ANALOG VIDEO OUTPUT BOARD
DVS-V1616 : DIGITAL VIDEO ROUTING SWITCHER

**Analog system**

**<Audio switcher>**
BVS-A1212 : AUDIO ROUTING SWITCHER

**<Video switcher>**
BVS-V1212 : VIDEO ROUTING SWITCHER

**<Application software>**
BZC-100: REMOTE CONTROL SOFTWARE
BZC-110: PLAYBACK SOFTWARE
BZC-120: RECORD SOFTWARE

3. Input and executing automatic test mode
   Input: Check that TEST-** is displayed on the display panel. If not displayed, press the KEY-1 (TEST) key.
   Executing: After input, press the KEY-4 (EXECUTION/CANCEL) key. The automatic test with input is executed.
   Whenever completing each test mode, press the KEY-4 (EXECUTION/CANCEL) key. The next test mode is executed automatically.
4. Cancelling test mode
   When cancelling a test mode during executing, press the KEY-4 (EXECUTION/CANCEL) key.
   The test number during executing the test such as TEST-XX is displayed on the display panel, and the test mode ends.
   When cancelling an automatic test mode during executing, press the KEY-1 (TEST) key.
5. When an error occurs during executing test mode
   When an error occurs on the test sequence, the error code ERR-XX (XX is the test number.) is displayed on the display panel and the test is cancelled. (When an error by the cause of other than that of the test occurs, the error message such as ERR-xxxx, RAM-xxxx, INI-xxxx and SRV-xxxx is displayed on the display panel.)
   When an error occurs on the test sequence, press the KEY-4 (EXECUTION/CANCEL) key, and you can go to the next test.
   **Note:** In case of the test such as an operator judge the consequence, an error is not displayed on the display panel.
6. Resetting test mode to the initial setting
   Press the KEY-1 (TEST) key. TEST-** is displayed on the display panel, and the test mode is reset to the initial setting.
7. Returning test mode to normal mode
   Press the KEY-4 (EXECUTION/CANCEL) key with pressing the KEY-1 (TEST) key. IN-USE is displayed on the display panel, and the mode is returned to the normal mode.

### 5-2-3. Test Mode

1. TEST-0X (Common area check)
   Common area: Display panel, alarm, tarry and bin lamps checks
   ① TEST-01 (Display panel check)
   Subject: DP-178 board function check (1)
   Contents: 1) Check that diodes (Dot matrix) are turned on.
   2) When pressing the KEY-4 (EXECUTION/CANCEL) key, the next test is executed.
   ② TEST-02 (Intermittently alarm check)
   Subject: DP-178 board function check (2)
   Contents: 1) Check that EXEC-02 is displayed on the display panel.
   2) Check that an alarm is sounded.
   3) When pressing the KEY-4 (EXECUTION/CANCEL) key, the next test is executed.
   ③ TEST-03 (Tarry check)
   Subject: DP-178 board function check (3)
   Contents: 1) Check that EXEC-03 is displayed on the display panel.
   2) Check that TARRY (ON AIR) is displayed on the display panel.
   3) When pressing the KEY-4 (EXECUTION/CANCEL) key, the next test is executed.
   ④ TEST-04 (Bin lamp check)
   Subjects: For Betacam and S-VHS series : SE-198 and 199 boards function check
   For D-1 and D-2 series: SE-200 and SE-201 boards function check
   Contents: 1) Check that EXEC-04 is displayed on the display panel.
   2) Check that the bin lamps are turned on.
   3) When pressing the KEY-4 (EXECUTION/CANCEL) key, the next test is executed.

2. TEST-1X (Sensor check)

① TEST-10 (Door sensor check)

Subjects: Door sensor function check
SE-192 board function check (1)

Contents: 1) Check that EXEC-10 is displayed on the display panel.
2) When pressing the DOOR OPEN key, check that the last digit of EXEC-10 ■ is turned on.
3) When the door is locked, check that the last digit of EXEC-10 ■ is turned off.
4) When pressing the KEY-4 (EXECUTION/CANCEL) key, the next test is executed.

② TEST-11 (Protrusion sensor check)

Subjects: SE-192 board function check (2)
SE-193 board function check

Contents: This test mode can be performed with the door's opening.
1) Check that EXEC-11 is displayed on the display panel.
When pressing the DOOR OPEN key in this test mode, the door lock is released.
2) When shutting off a protrusion sensor, check that the last digit of EXEC-11 ■ is turned on.
3) When the sensor does not detect any protrusion, the last digit is turned off.
4) When pressing the KEY-4 (EXECUTION/CANCEL) key, the next test is executed.

③ TEST-12 (Rotary switch of bin/connector check)

Subjects: Rotary switch setting and function checks (SE-198 (for Betacam and S-VHS series) or SE-200 (for D-1 and D-2 series) board)
Pin connector connection check

Contents: 1) Check that the number of bin stages (BIN-XXXX) is displayed on the display panel and executed.
[Check contents]
- The number of bin lamps in each bin block with turned on are the same as the setting value of the rotary switch.
Check that the switch is set to 0, 1, 2, 3. ... in order.
- Check that the number of bin stages is displayed on the display panel.

2) When pressing the KEY-4 (EXECUTION/CANCEL) key, the next test is executed.

④ TEST-13 (Bin boards check)

Subjects: Check that the boards are installed on the bin block as shown below.
For example:
[Bin block and boards]

| | |
|---|---|
| BKFC-8D (for D-1 and D-2 series): | SE-200 and SE-201 boards |
| BKFC-10B (for Betacam series): | SE-198 and SE-199 boards |
| BKFC-10S (for S-VHS series): | SE-198 and SE-199 boards |

Check contents: 1) When executing the test, check that the followings are displayed on the display panel.
Check that rotary switch number and board name are displayed on the display panel in order.

Number of stages on the bin ↓ ↓ Boards with installed on the bin

"0 : D1/D2"
"0 : BVW"
"0 : S-VHS"

After that, whenever you press the KEY-3 (1's digit) key, the types of boards with installed on the bin blocks are displayed repeatedly.

2) When pressing the KEY-4 (EXECUTION/CANCEL) key, the next test is executed.

# SECTION 6
# PERIODIC INSPECTION

It is recommended to perform periodic maintenance and inspection by referring to hours meter of the front panel to obtain higher performance and extend the life of the cart machine.

- The periodic inspection program of only the cart machine is shown in this section. For other equipments, see each periodic inspection program which are shown each manual.

***1) But, the periodic inspection program of the VTR cassette compertment contact surface creaning is shown in right table. It is likely possible that the stains on the cassette compertment cause the damage to the cartmachine.**

- The replacing time shown in the table is not guarantee period of the parts.
  The periods of check, cleaning, supplying oil and replace depend on using condition. So please refer to the table when maintenance and inspection are planned.

- The time and the number of the times shown in the table are the values which are indicated by the hours meter (TEST-80) of the cart machine.

The hours meter shows total time or total number of the times of the following three kinds.

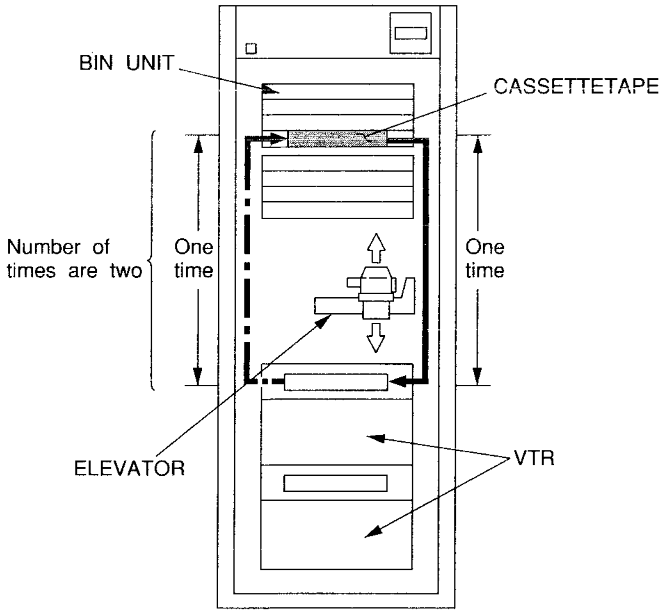
**"T1-XXXX"**
Total operating time of the cart machine.
10 hours unit

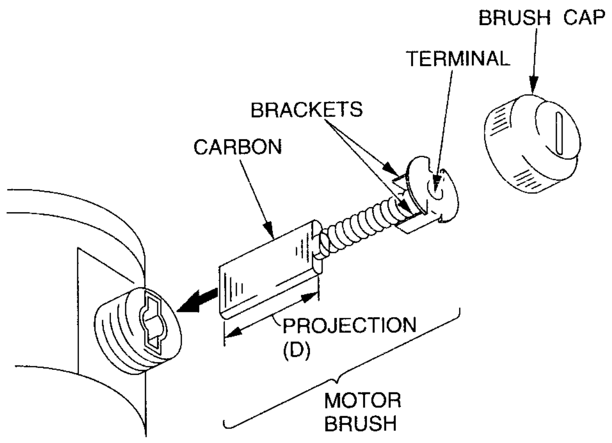
**"T2-XXXX"**
Total operating time that the cassette moves between bin and VTR.
10 hours unit

**"T3-XXXX"**
Total number of the times that the cassette moves between bin and VTR. 1000 times unit.
For how to count number of the times that the cassette moves, see as follows:

One time is that the elevater moves from bin to VTR, or it moves from VTR to bin.
For example, when the elevater moves from bin to VTR and from VTR to bin, number of times are two.

| BLOCK | PART NAME | PART NUMBER | PAGE OF EXPLODED VIEW | PERIODIC MAINTENANCE TIME | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CHECK | CLEANING | APPLY OIL | REPLACEMENT | | |
| | | | | | | | HOURS METER MODE | REPLACEMENT TIME | |
| ELEVATOR BLOCK | **ELEVATOR STAGE ASSEMBLY** | A-8267-650- | 16-11 | | | | T3-1000 | Once five year | • For replacement, see section 9-5. |
| | [X STAGE BLOCK] | | | | | | | | For check, cleaning and applying oil, see section 7. Periodic Inspection and Maintenance. |
| | EV BASE (RACK GEAR) | 3-178-921- | 16-11 | Once a month | Optional | Optional | — | — | |
| | LINEAR WAY | 3-178-876- | 16-11 | Once a month | Optional | Optional | — | — | |
| | [Z STAGE BLOCK] | | | | | | | | |
| | CASSETTE CONTACT SURFACE | — | — | Once a week | Once a week | — | — | — | |
| | EV BASE (RACK GEAR) | 3-178-921- | 16-11 | Once a month | Optional | Optional | — | — | |
| | LINEAR WAY | 3-178-876- | 16-11 | Once a month | Optional | Optional | — | — | |
| | **HAND ASSEMBLY** | A-8267-261- | 16-8 | | | | T3-1000 | Once five year | • For replacement, see section 9-3. |
| | [HAND BLOCK] | | | | | | | | |
| | UPPER/LOWER FINGER PLATES | 3-178-879- | 16-8 | Once a week | Once a week | — | — | — | For check, cleaning and applying oil, see section 7. Periodic Inspection and Maintenance. |
| | HAND GEAR | 3-178-884- | 16-8 | Once a year | — | Optional | — | — | |
| | MOTOR GEAR | 3-178-899- | 16-8 | Once a year | — | Optional | — | — | |
| | HAND LINEAR WAY | 3-178-875- | 16-8 | Once a year | — | Optional | — | — | |
| | HAND DRIVE GEAR | 3-178-898- | 16-8 | Once a year | — | Optional | — | — | |
| | SCREW SHAT | 3-178-883- | 16-8 | Once a year | — | Optional | — | — | |
| | SPATULA CONTACT SURFACE | 3-179-458- | 16-8 | Once a year | — | Optional | — | — | |
| *1 VTR | CASSETTE COMPERTMENT CONTACT SURFACE | — | — | — | Once a week | — | — | — | • For cleaning, see the manual of the VTR. |





**∗2) Motor brush projection check**

Remove the motor brush from the Y drive motor.
(For removing, see section 9-7-2.)
Confirm that projection (D) of the carbon satisfies the following specification.
Specification: Projection (D)≤7 mm

**Note:** When projection (D) becomes 7 mm or around, it is recommended to replace the motor brush.

| BLOCK | PART NAME | PART NUMBER | PAGE OF EXPLODED VIEW | PERIODIC MAINTENANCE TIME | | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | CHECK | CLEANING | APPLY OIL | REPLACEMENT | | |
| | | | | | | | HOURS METER MODE | REPLACEMENT TIME | |
| Y DRIVE BLOCK | DC SERVO MOTOR (Y DRIVE MOTOR) | A-8167-028- | 16-12 | ∗2 Once five year or every T3-1000<br>∗3 Once a year | —— | —— | —— | —— | Check as follws:<br>• Check the projection of the motor brush. (∗2)<br>• Check whethen the rotating sownds are normal or not. (∗3) |
| | LINEAR WAY (LWHS 20) | 3-178-891- | 16-12 | Once a year | Once a year | Once a year | —— | —— | For check, cleaning and applying oil, see section 7. Periodic Inspection and Maintenance. |
| | TIMING BELT (L) | 3-178-825- | 16-12 | Once a year | —— | —— | —— | —— | Check as follows:<br>• Check whether the belt is damaged or not.<br>• when checking, perform the timing belt tension adjustment.<br>Timing belt (L): see section 9-6-1.<br>Timing belt (S): see section 9-7-1. |
| | TIMING BELT (S) | 3-180-083- | 16-12 | Once a year | —— | —— | —— | —— | |
| | FLAT CABLE (ELV-1) | 1-696-901- | 16-3 | Once a year | —— | —— | —— | Once five years | Check whether the cable is damaged or not. |
| CPU-107 BOARD | BACK-UP BATTERY (Ni-Cd) | 1-528-163-11 | —— | —— | —— | —— | T1-3500 | Once four years | For replacement, see section 4-15-3. |
| FRONT DOOR BLOCK | PLUNGER SOLENOID | 1-951-169- | 16-3 | —— | —— | —— | T1-4400 | Once five years | For replacement see section as follows.<br>∗A: section 16. Frame Block.<br>∗B: section 9-8. |
| | MICRO SWITCH | ∗A 1-951-170-<br>∗B 1-952-389- | 16-3 | —— | —— | —— | T1-4400 | Once five years | |
| BIN UNIT | BIN PLATE (BKFC-8D) | A-8267-055- | 16-15 | Once a month | Once a month | —— | —— | —— | |
| | BIN PLATE (BKFC-10B) | A-8267-053- | 16-15 | Once a month | Once a month | —— | —— | —— | |
| | BIN PLATE (BKFC-10S) | A-8267-057- | 16-15 | Once a month | Once a month | —— | —— | —— | |

| **Note:** ∗A | Serial No. J ; | 30015 and former | ∗B | Serial No. J ; | 30016 and higher |
|---|---|---|---|---|---|
| | UC ; | 10138 and former | | UC ; | 10139 and higher |
| | EK ; | 20047 and former | | EK ; | 20048 and higher |

# SECTION 8
# SPARE PARTS

## 8-1. NOTES ON REPAIR PARTS

### (1) Safety Related Components Warning

Components marked with ⚠ on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation.
Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.

### (2) Standardization of Parts

Repair parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to "accommodating the improved parts and/or engineering changes" or "standarzation of genuine parts".
This manual's exploded views and electrical spare parts list are indicating the part numbers of "the standardized genuine parts at present".

### (3) Stock of Parts

Parts marked with "o" SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with "o" will be processed, but allow for additional delivery time.

### (4) Units for Capacitors, Inductors and Resistors

The following units are assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.

Capacitors : μF
Inductors : μH
Resistors : Ω

## 補修用部品注意事項

### (1) 安全重要部品

回路図、分解図、電気部品表中、⚠印の部品は安全性を維持するために重要な部品です。従ってこれらの部品を交換するときには必ず指定の部品と交換して下さい。

### (2) 部品の共通化

ソニーから供給される部品はセットに実装されているものと異なることがあります。これは部品の共通化、改良等によるものです。
分解図や電気部品表には現時点での共通化された部品が記載されています。

### (3) 部品の在庫

部品表のSP (Supply code) 欄にoで示される部品は交換頻度が低い部品ですので在庫していないことがあり、納期が長くなることがあります。

### (4) コンデンサ、インダクタ、抵抗の単位

回路図、分解図、電気部品表中、特に明記したものを除き、下記の単位は省略されています。

コンデンサ　：μF
インダクタ　：μH
抵抗　：Ω

## 8-2. ELECTRICAL PARTS LIST

RD-24 BOARD

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| #1pc | A-8275-177-B | o | MUNTED CIRCUIT BOARD, RD-24 |
| #2pcs | 3-172-089-01 | o | HANDLE |
| #1pc | 3-178-856-02 | o | PANEL (CPU-118), CONNECTOR |
| #2pcs | 3-696-510-01 | s | WASHER (3),STOPPER |
| #2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| #2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| #2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| #2pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| C1 | 1-126-163-11 | s | ELECT 4.7uF 20% 50V |
| C2 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C3 | 1-107-158-00 | s | MICA 30PF 5% 500V |
| C4 | 1-107-158-00 | s | MICA 30PF 5% 500V |
| C5 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C6 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C7 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C8 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C9 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C10 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C11 | 1-162-282-31 | s | CERAMIC 100PF 10% 50V |
| C12 | 1-162-282-31 | s | CERAMIC 100PF 10% 50V |
| C13 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C14 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C15 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C16 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C17 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C18 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C19 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C20 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C21 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C22 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C23 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C24 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C25 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C26 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C27 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C28 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C29 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C30 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C31 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C32 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C33 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C34 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C35 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C36 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C37 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C38 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C39 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C40 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C41 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C42 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C43 | 1-162-282-31 | s | CERAMIC 100PF 10% 50V |
| CB1 | ⚠1-576-254-11 | s | BREAKER, CIRCUIT 1A 250V |
| CN1 | 1-568-144-11 | o | CONNECTOR, DIN 96P, MALE |
| D1 | 8-719-821-38 | s | LED TLG224, GRN |
| D2 | 8-719-920-05 | s | DIODE SLP281C-50 |

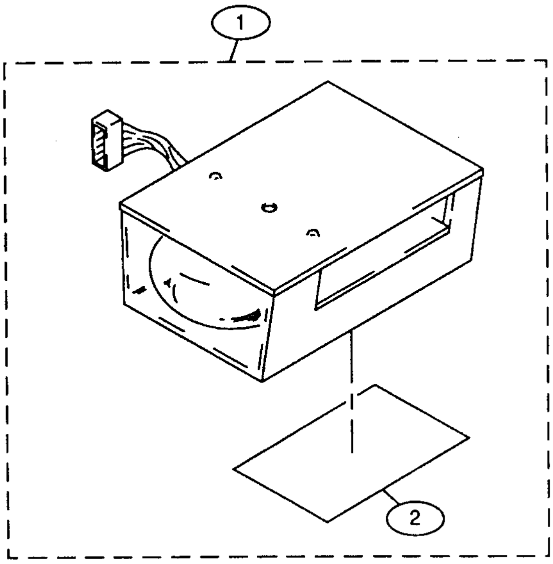
NOTE1: For the # marked in the following parts list, refer to section 9, Changed Part.

(RD-24 BOARD)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| IC1 | 8-759-209-04 | s | IC TMPZ84C00AP-8 |
| IC2 | 8-759-180-83 | o | IC 27C256-RD24 V1.00 EPROM |
| IC3 | 8-759-156-29 | s | IC LH5168-10TL |
| IC4 | 8-759-066-82 | s | IC TMPZ84C30AP-8 |
| IC5 | 8-759-947-36 | s | IC MB8422-90LP |
| IC6 | 8-759-912-21 | s | IC SN74ALS245AN |
| IC7 | 8-759-921-22 | s | IC SN74HC164AN |
| IC8 | 8-759-904-77 | s | IC AM26LS32ACN |
| IC9 | 8-759-916-29 | s | IC SN74HC74AN |
| IC10 | 8-759-916-25 | s | IC SN74HC32AN |
| IC11 | 8-759-946-63 | s | IC SN74ALS541N |
| IC12 | 8-759-946-63 | s | IC SN74ALS541N |
| IC13 | 8-759-917-11 | s | IC SN74HC393AN |
| IC14 | 8-759-916-79 | s | IC SN74HC273AN |
| IC15 | 8-759-916-48 | s | IC SN74HC151AN |
| IC16 | 8-759-916-46 | s | IC SN74HC139AN |
| IC17 | 8-759-916-96 | s | IC SN74HC374AN |
| IC18 | 8-759-916-96 | s | IC SN74HC374AN |
| IC19 | 8-759-917-43 | s | IC SN74HC138AN |
| IC20 | 8-759-007-09 | s | IC MC74HC540N |
| IC22 | 8-759-239-65 | s | IC TC74HC590AP |
| IC23 | 8-759-239-65 | s | IC TC74HC590AP |
| IC24 | 8-759-239-65 | s | IC TC74HC590AP |
| IC25 | 8-759-239-65 | s | IC TC74HC590AP |
| IC26 | 8-759-916-25 | s | IC SN74HC32AN |
| IC27 | 8-759-917-11 | s | IC SN74HC393AN |
| IC28 | 8-759-916-16 | s | IC SN74HC08AN |
| IC29 | 8-759-917-18 | s | IC SN74HCU04AN |
| IC30 | 8-759-916-14 | s | IC SN74HC04AN |
| IC31 | 8-759-916-20 | s | IC SN74HC14AN |
| IC32 | 8-759-921-08 | s | IC SN74HC02AN |
| IC33 | 8-759-916-14 | s | IC SN74HC04AN |
| ICA2 | 1-526-659-00 | o | SOCKET, IC 28P |
| ND1 | 8-719-901-68 | s | LED GL-6R202, RED |
| Q1 | 8-729-119-78 | s | TRANSISTOR 2SC2785-HFE |
| Q2 | 8-729-119-78 | s | TRANSISTOR 2SC2785-HFE |
| R1 | 1-249-421-11 | s | CARBON 2.2K 5% 1/4W |
| R2 | 1-249-421-11 | s | CARBON 2.2K 5% 1/4W |
| R3 | 1-249-429-11 | s | CARBON 10K 5% 1/4W |
| R4 | 1-249-429-11 | s | CARBON 10K 5% 1/4W |
| R5 | 1-249-429-11 | s | CARBON 10K 5% 1/4W |
| R6 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| R7 | 1-249-419-11 | s | CARBON 1.5K 5% 1/4W |
| R8 | 1-249-405-11 | s | CARBON 100 5% 1/4W |
| R9 | 1-247-903-00 | s | CARBON 1M 5% 1/4W |
| R10 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| R11 | 1-249-429-11 | s | CARBON 10K 5% 1/4W |
| R12 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R13 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R14 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R15 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R16 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R17 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R18 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R19 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R20 | 1-249-415-11 | s | CARBON 680 5% 1/4W |

(RD-24 BOARD)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| R21 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R22 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R23 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R24 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R25 | 1-249-415-11 | s | CARBON 680 5% 1/4W |
| R26 | 1-249-429-11 | s | CARBON 10K 5% 1/4W |
| R27 | 1-249-429-11 | s | CARBON 10K 5% 1/4W |
| R28 | 1-249-429-11 | s | CARBON 10K 5% 1/4W |
| R29 | 1-249-419-11 | s | CARBON 1.5K 5% 1/4W |
| R30 | 1-249-429-11 | s | CARBON 10K 5% 1/4W |
| R31 | 1-249-429-11 | s | CARBON 10K 5% 1/4W |
| RB1 | 1-231-410-00 | s | RESISTOR BLOCK 10Kx8 |
| RB2 | 1-231-533-11 | s | RESISTOR BLOCK 10Kx4 |
| S1 | 1-554-303-21 | s | SWITCH, TACTILE |
| S2 | 1-570-623-11 | s | SWITCH, DIP 8-CKT |
| S3 | 1-554-303-21 | s | SWITCH, TACTILE |
| X1 | 1-567-927-11 | s | RESONATOR, CERAMIC 16MHz |



| No. | | Part No. | SP | Description |
|---|---|---|---|---|
| 1 | ⚠ | A-8267-760-A | s | BARCODE ASSY |
| 2 | | 4-621-544-01 | o | LABEL, LASER (CLASS 1) |

FRAME

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| CN8 (To CB-49 Board) | | | |
| | 1-569-193-11 | o | CONTACT, FEMALE AWG24-30 |
| | 1-569-198-11 | o | HOUSING, CONNECTOR 5P |
| To Barcode Reader (8pin) | | | |
| | 1-596-193-11 | o | CONTACT, FEMALE AWG24-30 |
| | 1-569-201-11 | o | HOUSING, CONNECTOR 8P |

PACKING MATERIALS & SUPPLIED ACCESSORIES

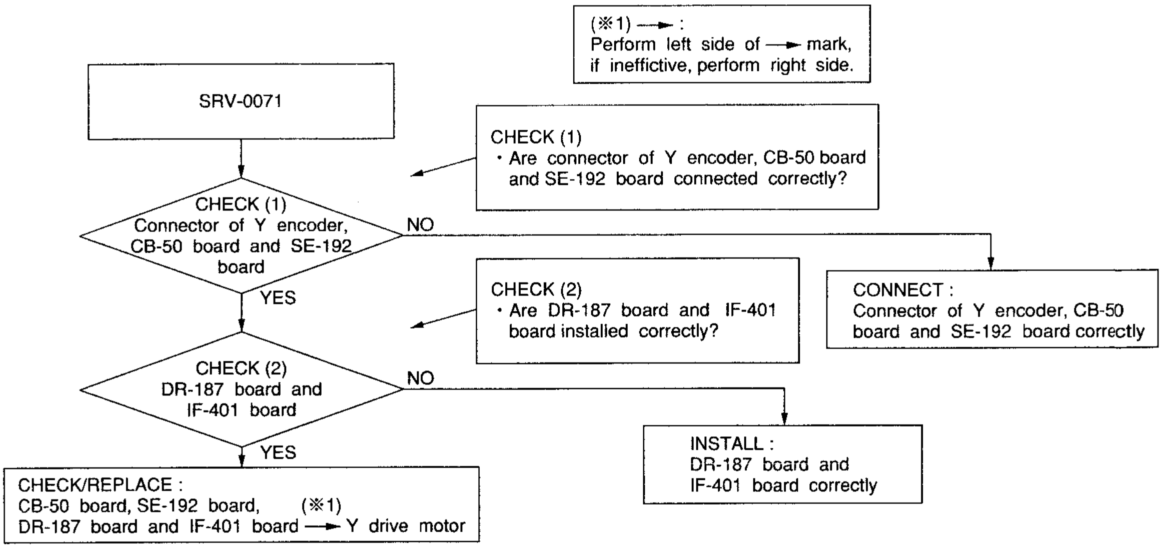
| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | 7-682-903-19 | s | SCREW +PWH 3X6 |

NOTE1: For the # marked in the following parts list, refer to section 9, Changed Part.

(3) SRV-0071: The servo turned off because servo of Y-direction could not follow the commands.

**Note:** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no CB-50 board.

CONFIRM :
There is no unusual load by move the elevator to up down fully manually, before check.


(※1) → :
Perform left side of → mark, if ineffictive, perform right side.
SRV-0071
CHECK (1)
• Are connector of Y encoder, CB-50 board and SE-192 board connected correctly?
CHECK (1)
Connector of Y encoder, CB-50 board and SE-192 board
NO
YES
CONNECT :
Connector of Y encoder, CB-50 board and SE-192 board correctly
CHECK (2)
• Are DR-187 board and IF-401 board installed correctly?
CHECK (2)
DR-187 board and IF-401 board
NO
YES
INSTALL :
DR-187 board and IF-401 board correctly
CHECK/REPLACE :
CB-50 board, SE-192 board, (※1)
DR-187 board and IF-401 board → Y drive motor

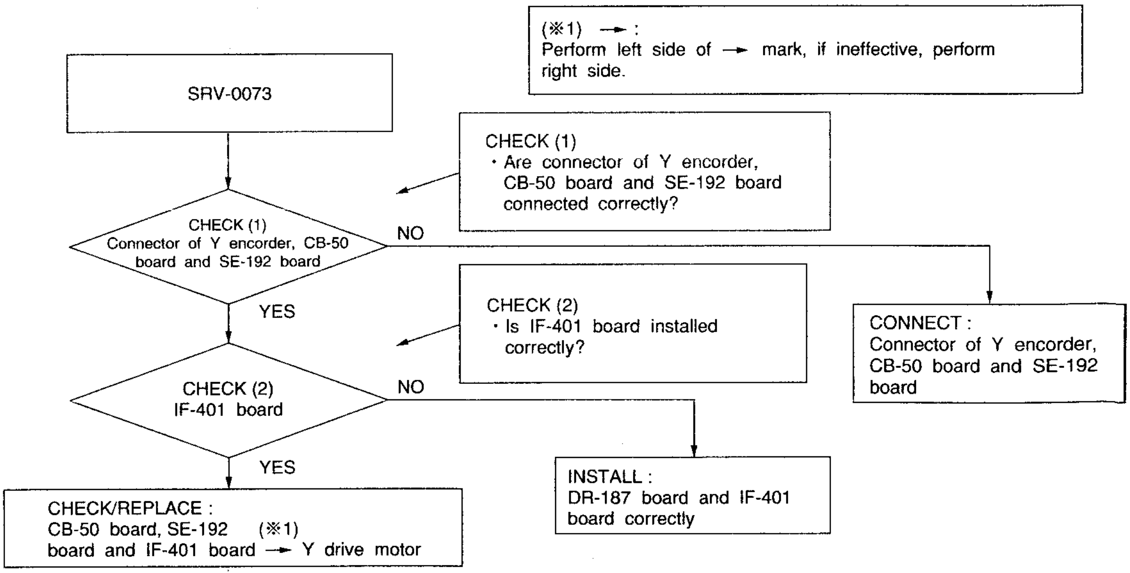
(4) SRV-0072: The servo turned off because it could not keep the elevator at the designated position.

- SRV-0072 is the same as (3) SRV-0071 (The servo turned off because servo of Y-direction could not follow the commands.).

(5) SRV-0073: The servo turned off because the Y-drive motor encoder pulse was not detected.

**Note:** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no CB-50 board.

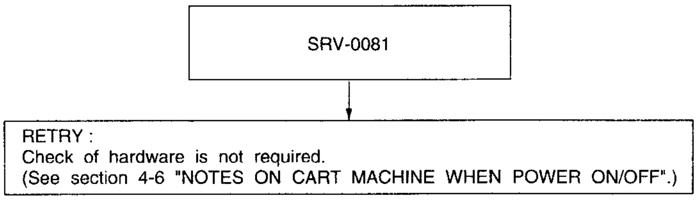
CONFIRM :
There is no unusual load by move the elevator to up and down fully manually, before check.


(※1) → :
Perform left side of → mark, if ineffective, perform right side.
SRV-0073
CHECK (1)
• Are connector of Y encorder, CB-50 board and SE-192 board connected correctly?
CHECK (1)
Connector of Y encorder, CB-50 board and SE-192 board
NO
YES
CONNECT :
Connector of Y encorder, CB-50 board and SE-192 board
CHECK (2)
• Is IF-401 board installed correctly?
CHECK (2)
IF-401 board
NO
YES
INSTALL :
DR-187 board and IF-401 board correctly
CHECK/REPLACE :
CB-50 board, SE-192 (※1)
board and IF-401 board → Y drive motor

(6) SRV-0074: The servo turned off because the acceleration of Y-direction exceeded the specified value.

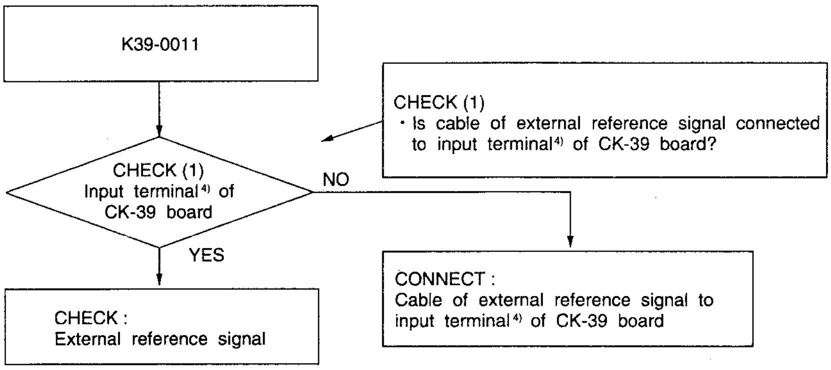
- SRV-0074 is the same as (3) SRV-0071 (The servo turned off because servo of Y-direction could not follow the commands.).

(7) SRV-0081: The electric current is shut off in an instant.

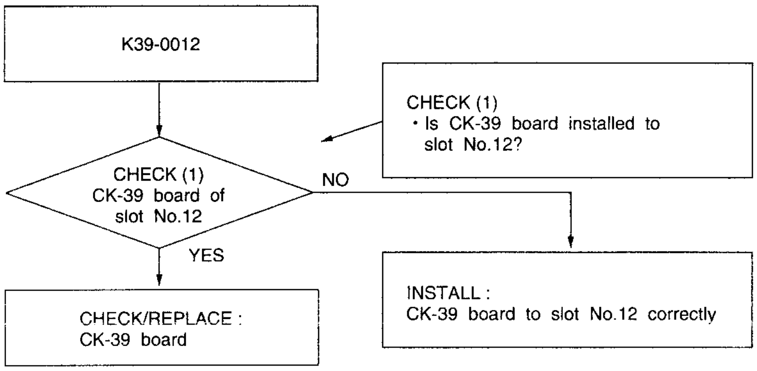

SRV-0081
RETRY :
Check of hardware is not required.
(See section 4-6 "NOTES ON CART MACHINE WHEN POWER ON/OFF".)

## 8-2-7. Error of CK-39 Board

(1) K39-0011: No reference video signal is input to the board.


K39-0011
CHECK (1)
• Is cable of external reference signal connected to input terminal[4] of CK-39 board?
CHECK (1)
Input terminal[4] of CK-39 board
NO
YES
CHECK :
External reference signal
CONNECT :
Cable of external reference signal to input terminal[4] of CK-39 board

(2) K39-0012: The board is not ready for operation.


K39-0012
CHECK (1)
• Is CK-39 board installed to slot No.12?
CHECK (1)
CK-39 board of slot No.12
NO
YES
CHECK/REPLACE :
CK-39 board
INSTALL :
CK-39 board to slot No.12 correctly

---

[4] Input terminal of CK-39 board: Input reference signal to REF video terminal of slot No. 12 (CK-39 board) of rear panel.

# SECTION 9
# REPLACEMENT OF MAJOR PART

## 9-1. GENERAL INFORMATION FOR PART REPLACEMENT

### 9-1-1. Elevator Assembly Component Replacement

This section describes the general information for the replacement of elevator assembly components.

1. The replacement procedures of elevator assembly components are described below.
   9-2. Elevator Assembly Replacement
   9-3. Hand Assembly Replacement
   9-4. Hand Assembly Components Replacement
   9-5. Elevator Stage Block Replacement
   9-6. Y Drive Block Components Replacement
   9-7. Y Drive Motor Assembly Replacement

2. The main power is usually set to OFF when the elevator assembly components are replaced.

3. After replacing, perform operation check.
   The operation check is performed by using test mode.
   When entering to the test mode, the cart machine cannot be communicated to a controlling unit and controlling the controlled unit, VTR.
   Do not execute the test mode when replacing in operating the controlling and controlled units.

4. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have some parts whose shapes differ. If parts must be replaced using a different procedure because of the difference in shape, the correct procedure is explained. If no particular replacement procedure is given, use the procedure for other serial numbers.

5. The front door is opened before replacing the elevator block components. (For how to open the front door, see section 4-2.)

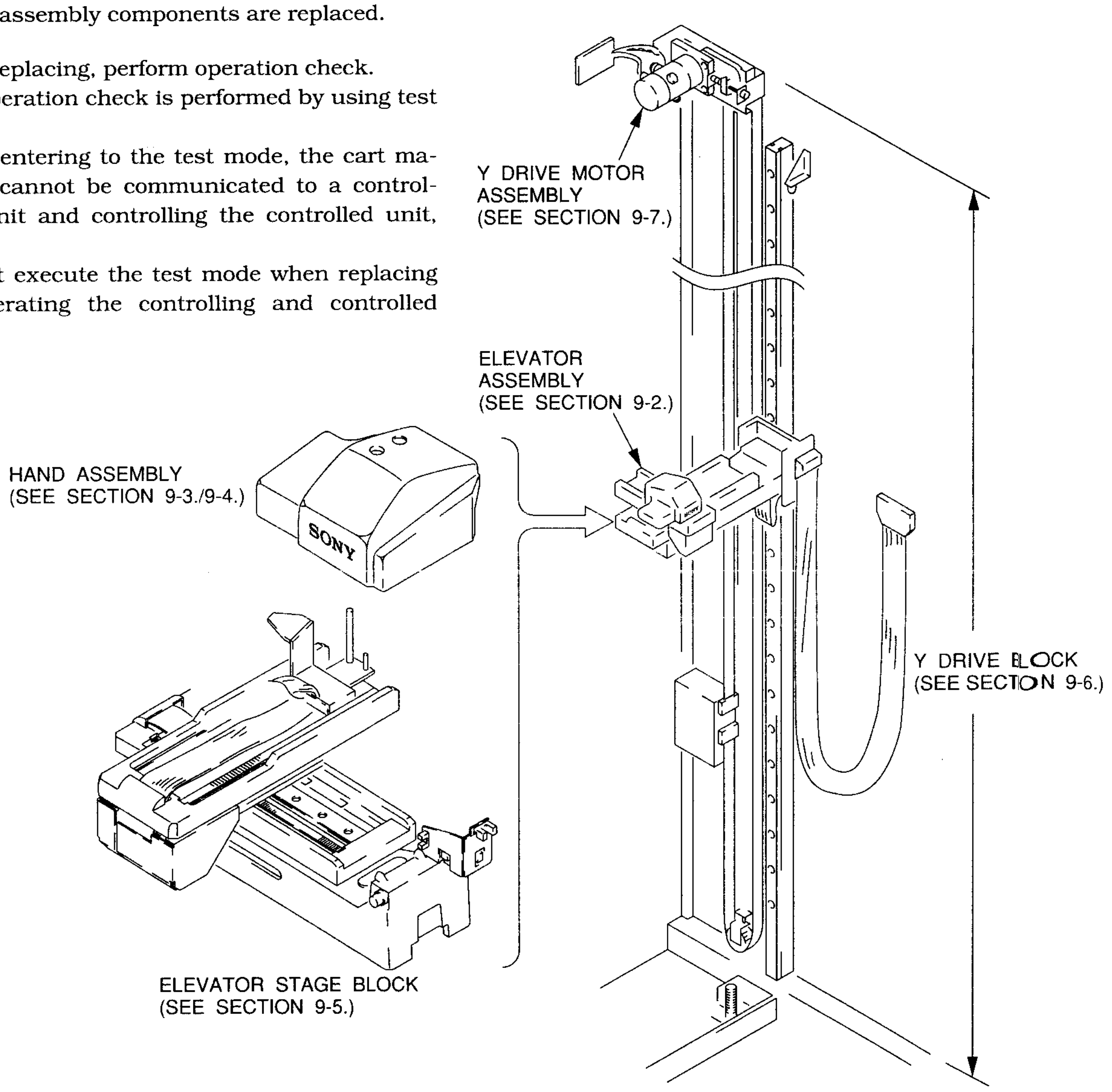
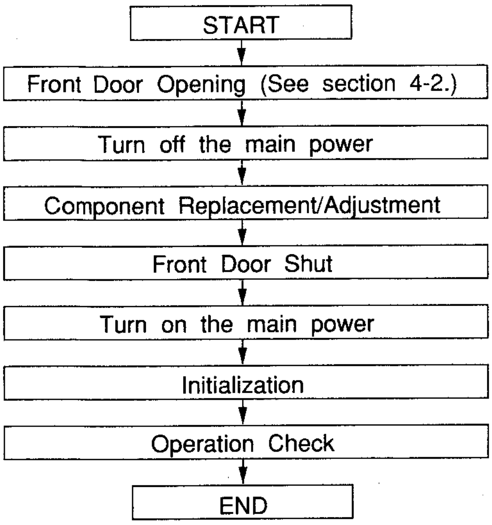

Y DRIVE MOTOR
ASSEMBLY
(SEE SECTION 9-7.)
ELEVATOR
ASSEMBLY
(SEE SECTION 9-2.)
HAND ASSEMBLY
(SEE SECTION 9-3./9-4.)
SONY
Y DRIVE BLOCK
(SEE SECTION 9-6.)
ELEVATOR STAGE BLOCK
(SEE SECTION 9-5.)

**Fig. 9-1-1. Elevator Assembly Component**

5. The replacement flowchart is shown below.


START
Front Door Opening (See section 4-2.)
Turn off the main power
Component Replacement/Adjustment
Front Door Shut
Turn on the main power
Initialization
Operation Check
END

**Replacement**

1. Open the front door. (See section 4-2.)
   Press the DOOR OPEN key. The elevator is then stored in the uppermost block, the lock of the front door is released, and the door is opened automatically.

2. Turn OFF the power of the cart machine. Turn OFF the main power of the power block (on the rear side).

3. Component replacement
   Replace each component with seeing the corresponding section.

4. Shut the front door.

5. Turn on the main power.

6. Perform initialization. (See section 4-6.)

7. Operation check
   Execute the automatic test mode of the test mode. (See the test mode in section 5.)
   **Note:** Do not enter the test mode when replacing in operating the controlling and controlled units.

8. End

# SECTION 9
# CHANGED PARTS

NOTE: The numbers identified by making with ) are matching with each serial numbers.
See the table mached with each serial numbers as follows;

403) Serial No. 10251 and higher

### RD-24 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | A-8275-177-A | o | MOUNTED CIRCUIT BOARD, RD-24 |
| 403) | 1pc | A-8275-177-B | o | MOUNTED CIRCUIT BOARD, RD-24 |
| OLD) | NOT IN USE. | | | |
| 403) | 2pcs | 3-172-089-11 | o | HANDLE |
| OLD) | 1pc | 3-178-856-01 | o | PANEL (CPU-118), CONNECTOR |
| 403) | 1pc | 3-178-856-02 | o | PANEL (CPU-118), CONNECTOR |
| OLD) | 2pcs | 3-680-316-11 | o | NUT (M4), STOPPER |
| 403) | 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| OLD) | NOT IN USE. | | | |
| 403) | 2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| OLD) | 2pcs | 7-682-565-04 | s | SCREW +B 4X16 |
| 403) | 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| OLD) | 2pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| 403) | 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| OLD) | NOT IN USE. | | | |
| 403) | 2pcs | 7-682-547-04 | s | SCREW +B 3X6 |

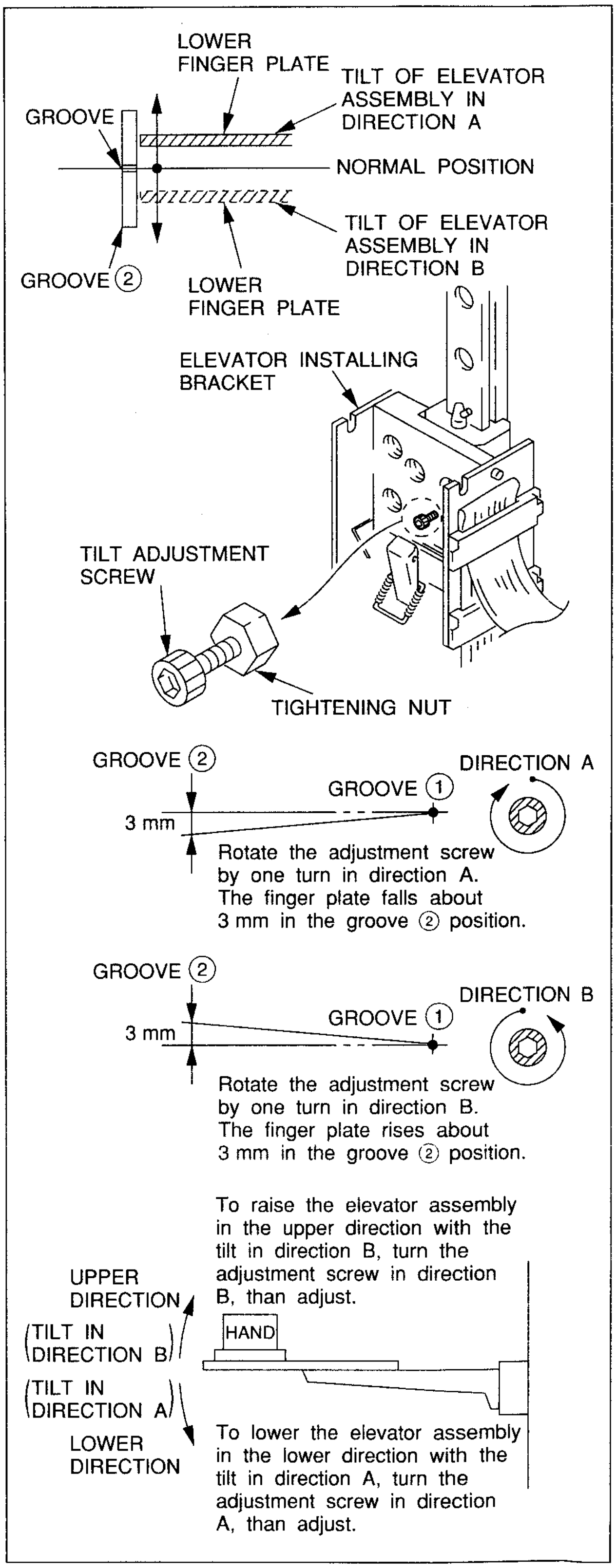
2. Elevator parallel adjustment

① Tilt direction confirmation of elevator assembly
Confirm the tilt direction (direction A or B) and tilt value shown in the figure, then memorize.

[Standard of tilt adjustment value]

1) Remove the elevator assembly from the elevator installing bracket and perform the elevator assembly parallel adjustment with the tilt adjustment screw and tightening nut shown in the figure.

2) Rotate the tilt adjustment screw by one turn. The tilt value then changes approximately 3 mm in direction A or B.


LOWER FINGER PLATE
TILT OF ELEVATOR ASSEMBLY IN DIRECTION A
GROOVE ①
NORMAL POSITION
TILT OF ELEVATOR ASSEMBLY IN DIRECTION B
GROOVE ②
LOWER FINGER PLATE
ELEVATOR INSTALLING BRACKET
TILT ADJUSTMENT SCREW
TIGHTENING NUT
GROOVE ②
DIRECTION A
GROOVE ①
3 mm
GROOVE ②
DIRECTION B
GROOVE ①
3 mm
UPPER DIRECTION
(TILT IN DIRECTION B)
(TILT IN DIRECTION A)
LOWER DIRECTION
HAND

Rotate the adjustment screw by one turn in direction A. The finger plate falls about 3 mm in the groove ② position.

Rotate the adjustment screw by one turn in direction B. The finger plate rises about 3 mm in the groove ② position.

To raise the elevator assembly in the upper direction with the tilt in direction B, turn the adjustment screw in direction B, than adjust.

To lower the elevator assembly in the lower direction with the tilt in direction A, turn the adjustment screw in direction A, than adjust.

Fig. 9-1-5. Elevator Parallel Adjustment (1)

② Remove the elevator assembly. (See section 9-2.)
- Move the elevator assembly to the position where it can be removed easily.
- Hold the counter weight (CW) in the place where the position mentioned above can be maintained. (See section 9-1-2.)

**Note:** If not holding the CW, the CW falls down and it might be out of order.

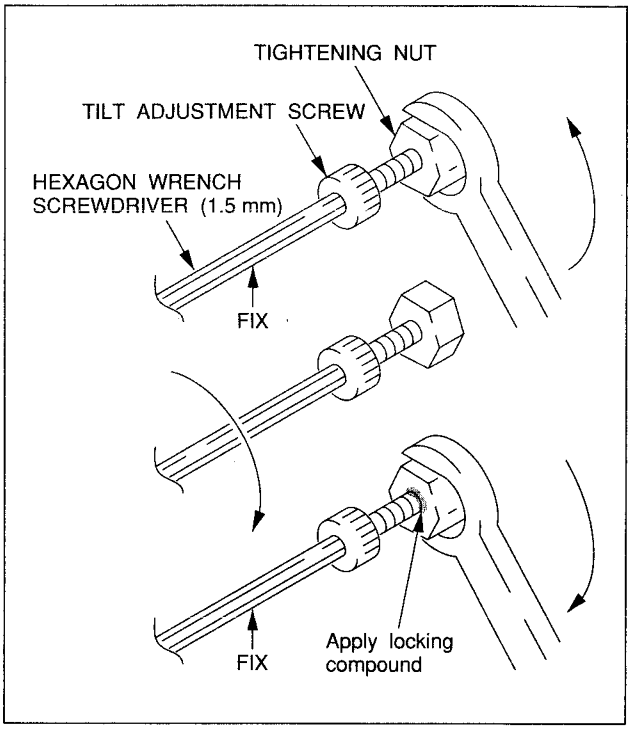


**Fig. 9-1-6. Elevator Parallel Adjustment (2)**

[Tilt adjustment in direction A]

1) Fix the tilt adjustment screw using a hexagon wrench screwdriver, turn the tightening nut counterclockwise, then loosen.
2) Turn the tilt adjustment screw clockwise as required.
3) Fix the tilt adjustment screw and fasten the tightening nut clockwise.
4) Install the elevator assembly. (Release the counter weight holding.)
5) Perform step 1, Elevator parallel check.
   If the conditions in step 1 are satisfied, perform steps 6) and later. If not, readjust.
6) Remove the elevator assembly and fasten the tightening nut with fixing the tilt adjustment screw.
7) Apply locking compound slightly to the tilt adjustment screw and tightening nut.
8) Install the elevator assembly.
9) Perform step 1, Elevator parallel check.
   If the conditions in step 1 are satisfied, perform step 3. If not, readjust.

## 9-1-5. Y Sensor Height Check/Adjustment

### Preliminary Information

A. This check and adjustment are performed when following components are removed or replaced.
Y sensor block components (See Fig.9-1-8.)
- Sensor bracket (X, Y)/Y sensor fixed plate

Elevator assembly components
- EV base/X base/Z base

This check is performed when a shock is given to the components mentioned above carelessly, too.

B. Y sensor detects origin of Y shaft (vertical direction) and each relation of the position between elevator and BIN, and elevator and VTR.

C. Y sensor height check is performed by applying the ruler to the Z stage and the Y sensor fixed plate.

D. Prepare the following tools for check and adjustment:
- Ruler (guaranteed linearity)
- Phillips screwdriver No. 2 (for M3 to M5)
- Locking compound

### [How to check and adjust]

1. Move the Z stage in the direction of arrow A so that position of the Z stage will be nearest to the sensor bracket (X,Y). (See Fig.-1.)

2. Apply a ruler to the A and B positions of the Z stage and C position of the Y sensor fixed plate. (See Fig.-2 and Fig.-3.)

3. Y sensor height check and adjustment

**(Check)**

Check that there are no clearance between edge of the ruler and A, B of the Z stage, and C of the Y sensor fixed plate as shown in the figure.
If there is clearance at A, B or C, perform the following adjustment.

**(Adjustment)**
- Loosen screw (A), and adjust the height of the Y sensor fixed plate.
- Tightening torque : 0. 8 N·m {8 kgf·cm}
- After tightening, apply locking compound slightly to the screw (A).

**Fig-1**

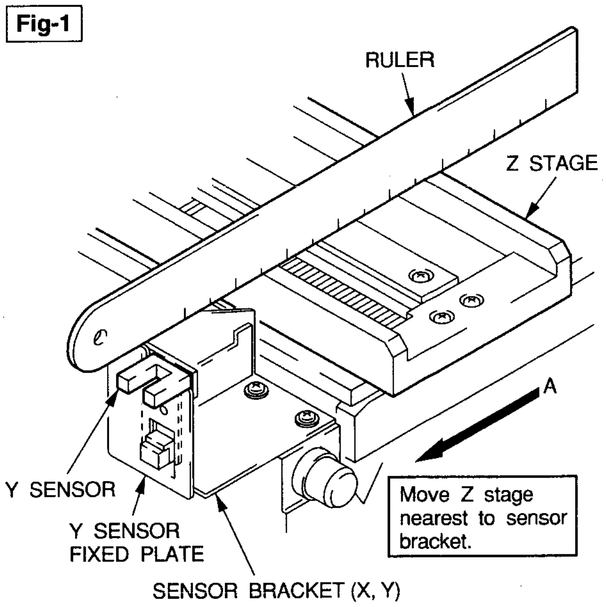

RULER
Z STAGE
A
Y SENSOR
Y SENSOR FIXED PLATE
SENSOR BRACKET (X, Y)
Move Z stage nearest to sensor bracket.

**Fig-2**

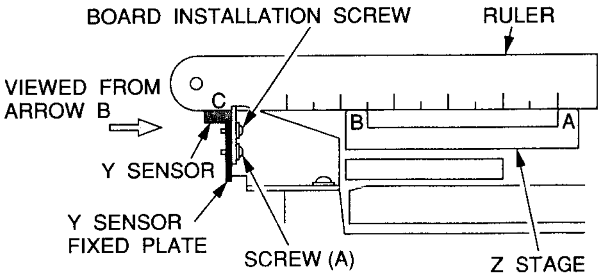

BOARD INSTALLATION SCREW
RULER
VIEWED FROM ARROW B
C
B
A
Y SENSOR
Y SENSOR FIXED PLATE
SCREW (A)
Z STAGE

**Fig-3** **[RULER APPLYING POSITION]**

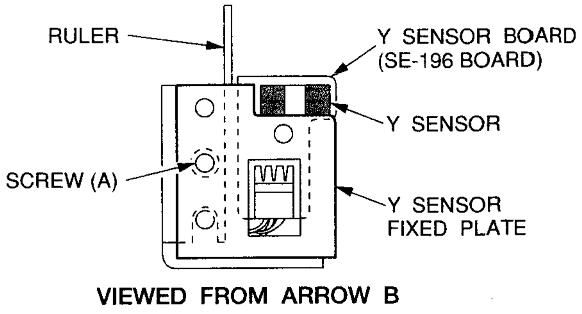

RULER
Y SENSOR BOARD (SE-196 BOARD)
Y SENSOR
SCREW (A)
Y SENSOR FIXED PLATE
VIEWED FROM ARROW B

Fig. 9-1-8. Y Sensor Height Check

## 9-2. ELEVATOR ASSEMBLY REPLACEMENT

### Preliminary Information

A. The elevator assembly is installed on the elevator installing bracket of the Y drive block. The elevator assembly consists of the hand assembly block with catching a cassette tape and the elevator stage block.

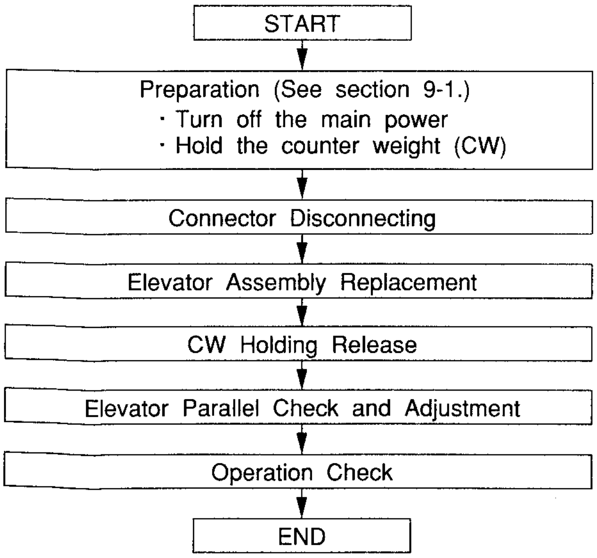
B. The elevator assembly transports the cassette tape between the bin and VTR or between the bins. To put the cassette tape in and out safely, the elevator assembly is then moved to the highest position, the lock of the front door is released, and the door is opened automatically. When pressing the DOOR OPEN key.

C. A counter weight (CW) is installed in the timing belt (L) as the balancer of the elevator assembly. Be sure to hold the counter weight when removing the elevator assembly stays at other position than the highest position, (the counter weight stays at the position except the lowest position). If not, the counter weight falls down and it might be out of order. (See section 9-1-2.)

D. Read the general information for part replacement in section 9-1. before replacing the elevator assembly.

E. Prepare the following tools for replacement:
- Phillips screwdriver No. 2 (for M3 to M5)
- Hexagon wrench screwdriver (1.5 mm)
- Spanner (for N3) (5.3 mm)
- Locking compound

F. The replacement flowchart is shown below.


START
Preparation (See section 9-1.)
· Turn off the main power
· Hold the counter weight (CW)
Connector Disconnecting
Elevator Assembly Replacement
CW Holding Release
Elevator Parallel Check and Adjustment
Operation Check
END

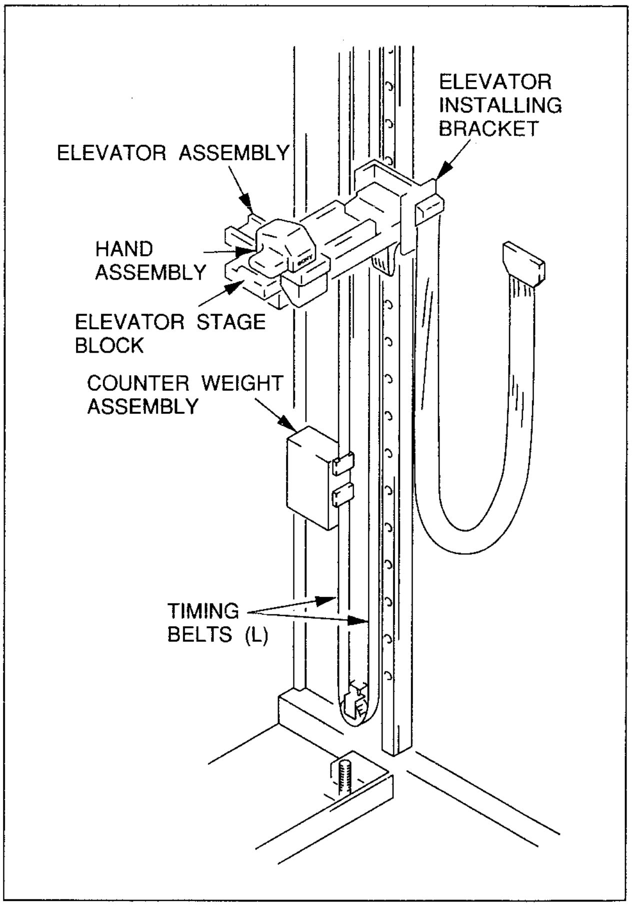

ELEVATOR ASSEMBLY
ELEVATOR INSTALLING BRACKET
HAND ASSEMBLY
ELEVATOR STAGE BLOCK
COUNTER WEIGHT ASSEMBLY
TIMING BELTS (L)

Fig. 9-2-1. Elevator Assembly Replacement (1)

G. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have some parts whose shapes differ. If parts must be replaced using a different procedure because of the difference in shape, the correct procedure is explained. If no particular replacement procedure is given, use the procedure for other serial numbers.

6. Upper finger plate installation
   ① Position the finger plate in the finger plate base.
   ② Tighten the upper finger plate with three screws (A), then install.
   ③ Install the link assembly and the spatula. (See section 9-4-3.)

7. Install the hand assembly.
   (See section 9-3.)

8. Clean the finger plate.
   Clean the surface of catching the cassette shell on it with a cloth moistened with cleaning fluid.

9. Install the hand cover.
   (See section 9-1-3.)

10. Turn ON the main power.

11. Operation check
    Execute the automatic test mode of the test mode. (See the test mode in section 5.)
    **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

## 9-5. ELEVATOR STAGE BLOCK REPLACEMENT

### Preliminary Information

A. The elevator stage block is a drive block that moves the hand assembly back and forth (Z-axis direction: Z stage) and right and left (X-axis direction: X stage).
This elevator stage block is the block obtained when the hand assembly is removed from the elevator assembly described in section 9-2.

B. The replacement procedures of elevator stage block components are described below.

9-5-1. Elevator Stage Assembly Replacement
9-5-2. X Drive Motor Replacement
9-5-3. Z Drive Motor Replacement
9-5-4. Flat Cable (Z) Replacement
9-5-5. Flat Cable (X) Replacement
9-5-6. X, Y, Z Origin Sensor Replacement
9-5-7. Timing Belts (X)/(Z) Replacement
9-5-8. Linear Way (X) Replacement
9-5-9. Linear Way (Z) Replacement

C. The procedure for replacing the EV base (X and Z stages) is not explained as an independent item. Install or remove parts based on the linear way replacement prodecure (section 9-5-8 or section 9-5-9).

D. Read the general information for part replacement in section 9-1. before replacing the elevator stage block.

E. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have some parts whose shapes differ. If parts must be replaced using a different procedure because of the difference in shape, the correct procedure is explained. If no particular replacement procedure is given, use the procedure for other serial numbers.

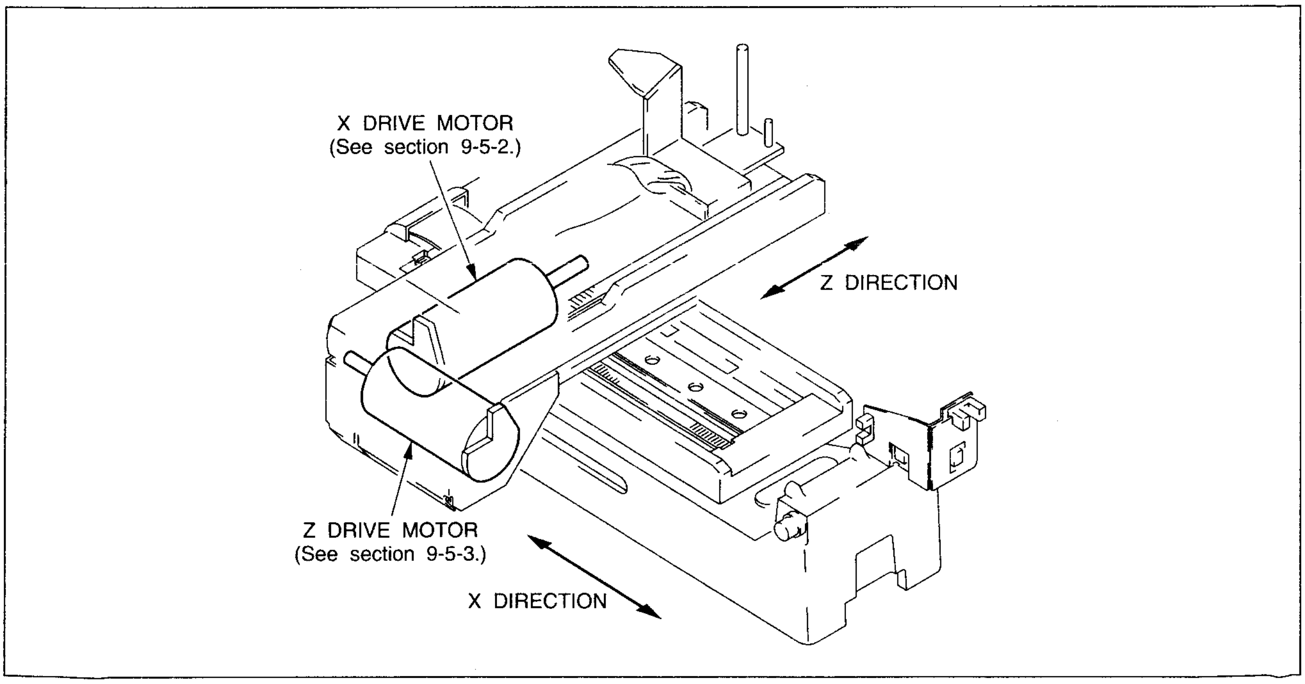


Fig. 9-5-1. Elevator Stage Block Replacement

⑥ Z drive motor replacement (See Fig. 9-5-12.)
Replace the Z drive motor and assemble in the reverse order of steps ① through ⑤.
Pay attention to the following during assembling:

1) Position of Z drive motor installation
   Install the Z drive motor in the motor bracket as shown in the figure.
2) Position of motor gear installation
   Install the Z drive motor so that the shutter plate of the motor gear comes to the center of the sensor slit as shown in the figure.
   **Note:** When moving the motor gear, check that the shutter plate do not touch the sensor. If touching, loosen the screw (D) and adjust the installed position of the motor gear.
3) Position of gear base assembly installation
   Insert the two gear stay tips of the gear base assembly into the two holes of the motor bracket, then install.
4) Screw tightening torque
   Screw (A), screw (B), screw (C), and screw (E):
   0.8 N • m {8 kgf • cm}
   Screw (D): 0.5 N • m {5 kgf • cm}
5) After tightening two screws (D), apply locking compound slightly to the screw block.

4. Install the elevator assembly.
   (See section 9-2.)
5. Release the CW holding.
   (See section 9-1-2.)
6. Perform the elevator parallel check and adjustment
   (See section 9-1-4.)
7. Turn ON the main power.
8. Operation check
   Execute the automatic test mode of the test mode.
   (See the test mode in section 5.)
   **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

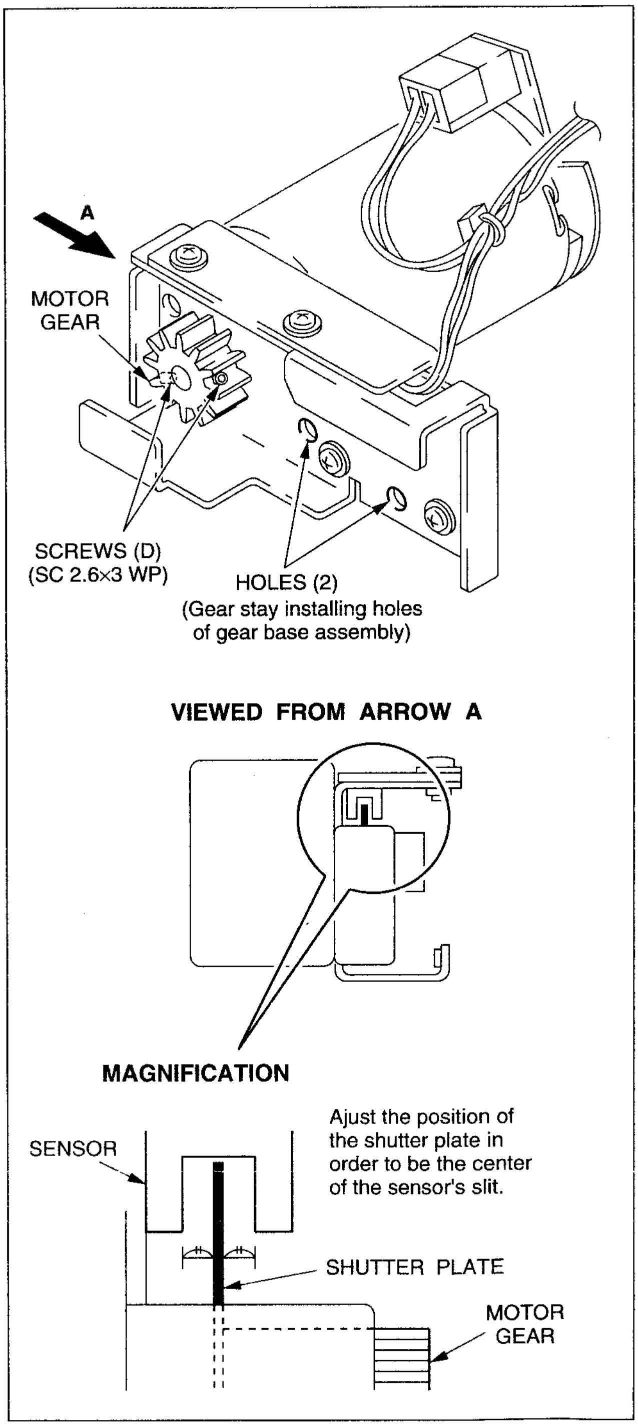

A
MOTOR GEAR
SCREWS (D) (SC 2.6×3 WP)
HOLES (2) (Gear stay installing holes of gear base assembly)
VIEWED FROM ARROW A
MAGNIFICATION
SENSOR
Ajust the position of the shutter plate in order to be the center of the sensor's slit.
SHUTTER PLATE
MOTOR GEAR

Fig. 9-5-12. Z Drive Motor Replacement

### 9-5-4. Flat Cable (Z) Replacement

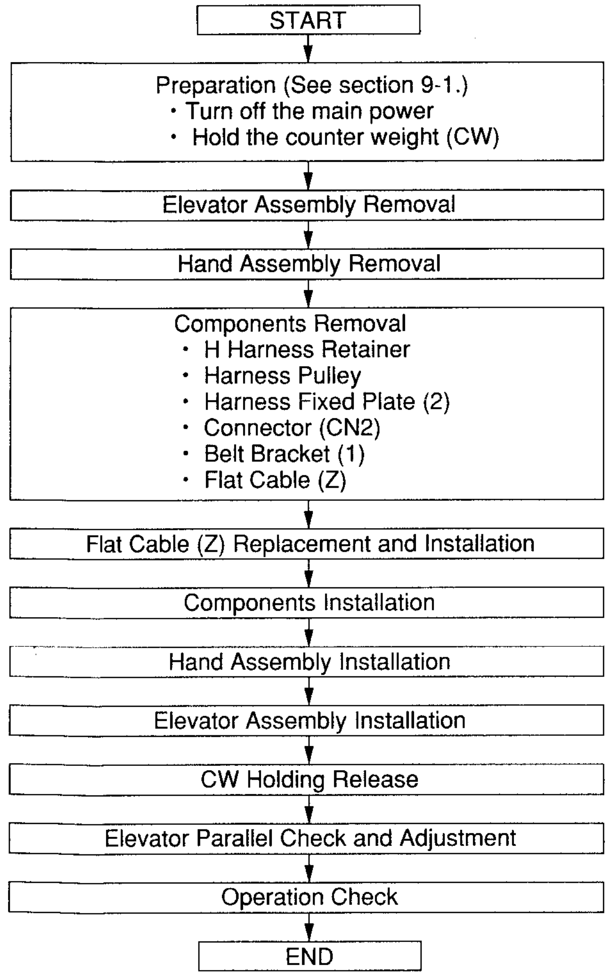
**Preliminary Information**

A. Flat cable (Z) replacement is performed by removing the elevator assembly from the Y drive block.

B. Read the general information for part replacement in section 9-1. before replacing the flat cable (Z).

C. Prepare the following tools for replacement:
- Phillips screwdriver No. 2 (for M3 to M5)
- Hexagon wrench screwdriver (1.5 mm)
- Spanner (for N3) (5.3 mm)
- Locking compound

D. The replacement flowchart is shown below.


START
Preparation (See section 9-1.)
• Turn off the main power
• Hold the counter weight (CW)
Elevator Assembly Removal
Hand Assembly Removal
Components Removal
• H Harness Retainer
• Harness Pulley
• Harness Fixed Plate (2)
• Connector (CN2)
• Belt Bracket (1)
• Flat Cable (Z)
Flat Cable (Z) Replacement and Installation
Components Installation
Hand Assembly Installation
Elevator Assembly Installation
CW Holding Release
Elevator Parallel Check and Adjustment
Operation Check
END

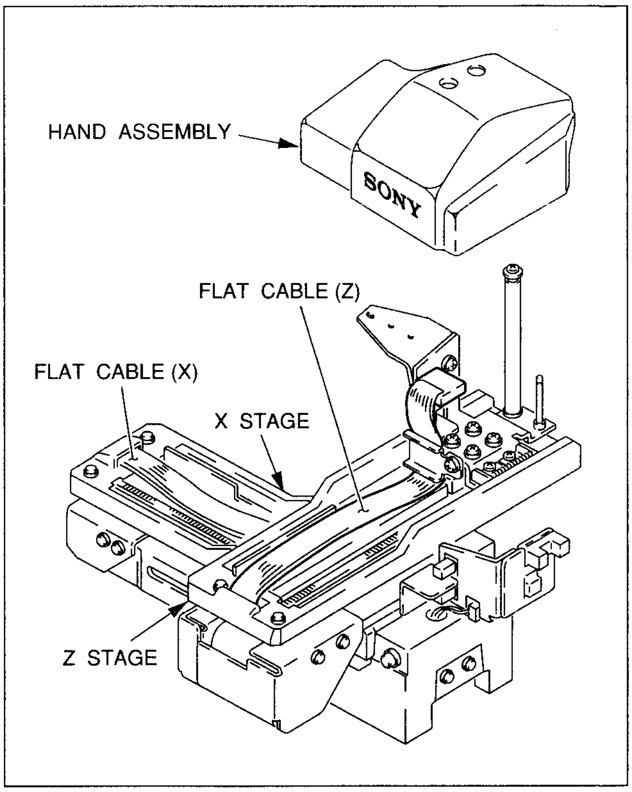

HAND ASSEMBLY
SONY
FLAT CABLE (Z)
FLAT CABLE (X)
X STAGE
Z STAGE

**Fig. 9-5-13. Flat Cable (Z) Replacement**

E. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have a cable clamper instead of a harness fixed plate (2). Therefore, the harness fixed plate (2) need not be installed or removed.

14. Install the harness pulley. (See Fig.9-5-19.)
    ① Fit the harness pulley to the HP shaft assembly.
    ② Put the HP shaft assembly which is assembled in step ① in the shaft of the belt shaft assembly.
    ③ Fit two protrusions of the Z stage to the guide holes of the HP shaft assembly correctly, and install with screw (B).

15. Install the H harness retainer. (See Fig.9-5-20.)
    ① Return the elevator stage from sideways to horizontally quietly.
    ② Move the Z stage in the direction of arrow (D) fully.
    ③ Affix the flat cable (Z) to the base assembly as shown in the figure. Hook the claw of the H harness retainer to the square hole of the base assembly, and hold the flat cable (Z).
    ④ Pull the flat cable (Z) in the direction of arrow (E), and install the H harness retainer with screw (A).
    **Note:** Pull the flat cable (Z) so as not to slack when bring to the end of arrow (D).
    (Do not pull too much.)

16. Install the hand assembly.
    (See section 9-3.)

17. Install the elevator assembly.
    (See section 9-2.)

18. Release the CW holding.
    (See section 9-1-2.)

19. Perform the elevator parallel check and adjustment.
    (See section 9-1-4.)

20. Turn ON the main power.

21. Operation check
    Execute the automatic test mode of the test mode.
    (See the test mode in section 5.)
    **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

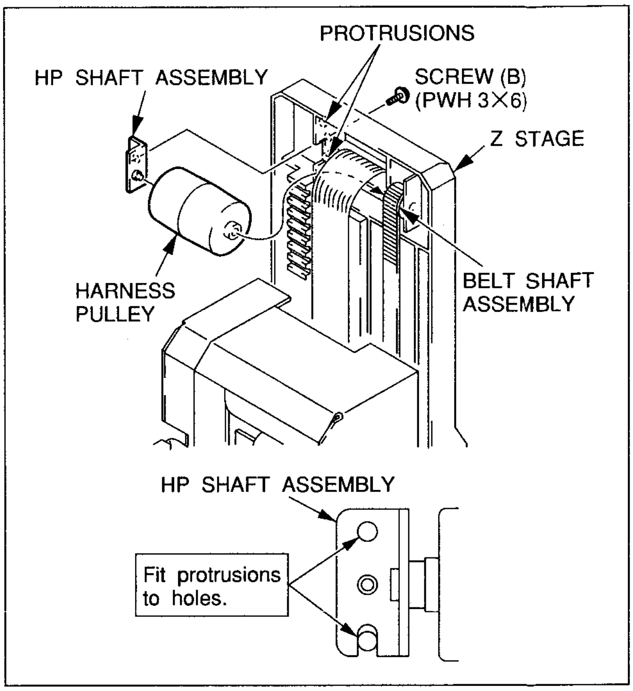

PROTRUSIONS
HP SHAFT ASSEMBLY
SCREW (B)
(PWH 3X6)
Z STAGE
HARNESS PULLEY
BELT SHAFT ASSEMBLY
HP SHAFT ASSEMBLY
Fit protrusions to holes.

Fig. 9-5-19. Harness Pulley Installation

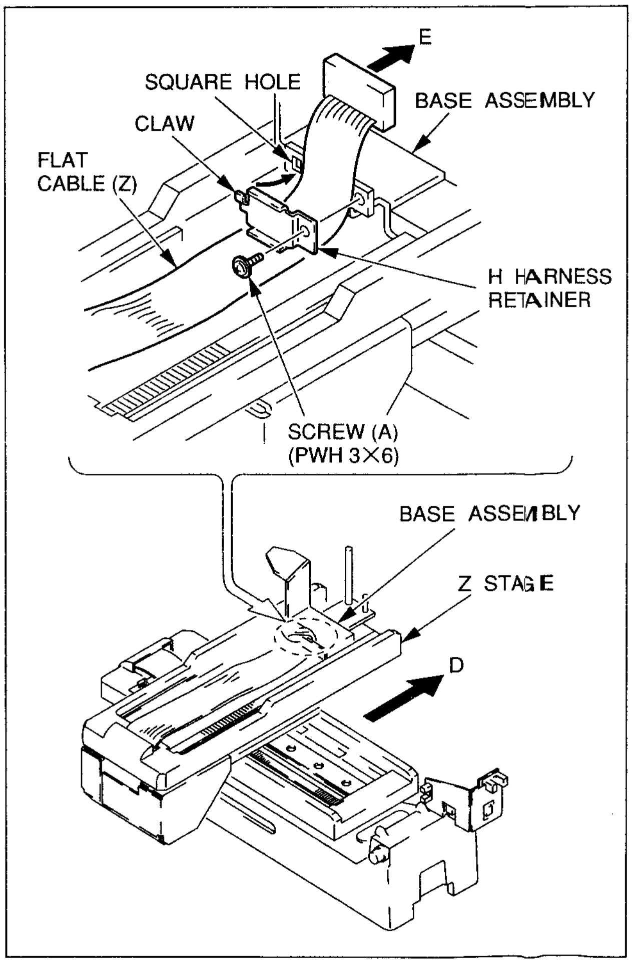

E
SQUARE HOLE
CLAW
BASE ASSEMBLY
FLAT CABLE (Z)
H HARNESS RETAINER
SCREW (A)
(PWH 3X6)
BASE ASSEMBLY
Z STAGE
D

Fig. 9-5-20. H Harness Retainer Installation

### 9-5-5. Flat Cable (X) Replacement

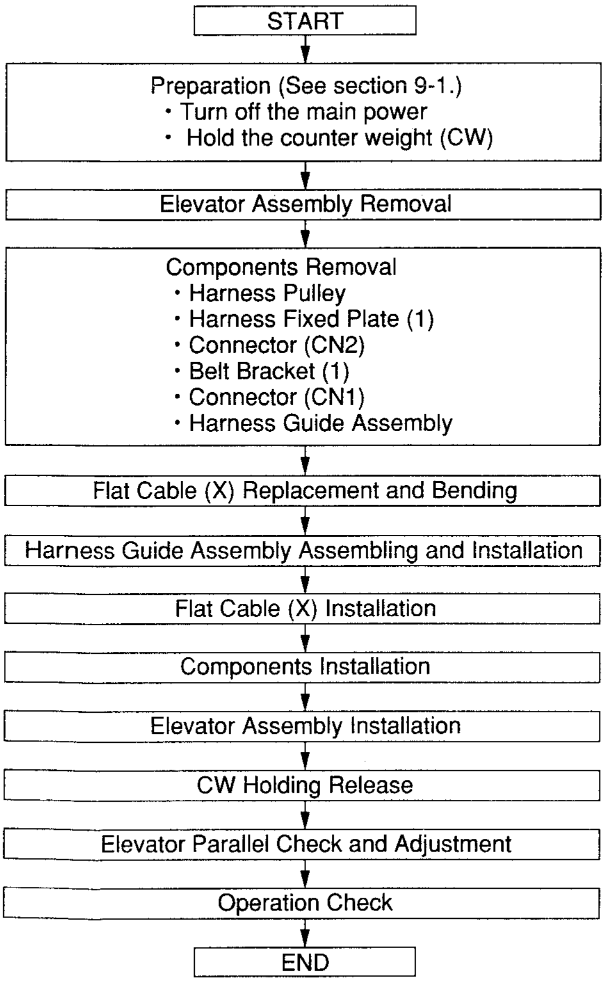
**Preliminary Information**

A. Flat cable (X) replacement is performed by removing the elevator assembly from the Y drive block.

B. Read the general information for part replacement in section 9-1. before replacing the flat cable (X).

C. Prepare the following tools for replacement.
- Phillips screwdriver No. 2 (for M3 to M5)
- Hexagon wrench screwdriver (1.5 mm)
- Spanner (for N3) (5.3 mm)
- Locking compound

D. The replacement flowchart is shown below.


START
Preparation (See section 9-1.)
• Turn off the main power
• Hold the counter weight (CW)
Elevator Assembly Removal
Components Removal
• Harness Pulley
• Harness Fixed Plate (1)
• Connector (CN2)
• Belt Bracket (1)
• Connector (CN1)
• Harness Guide Assembly
Flat Cable (X) Replacement and Bending
Harness Guide Assembly Assembling and Installation
Flat Cable (X) Installation
Components Installation
Elevator Assembly Installation
CW Holding Release
Elevator Parallel Check and Adjustment
Operation Check
END

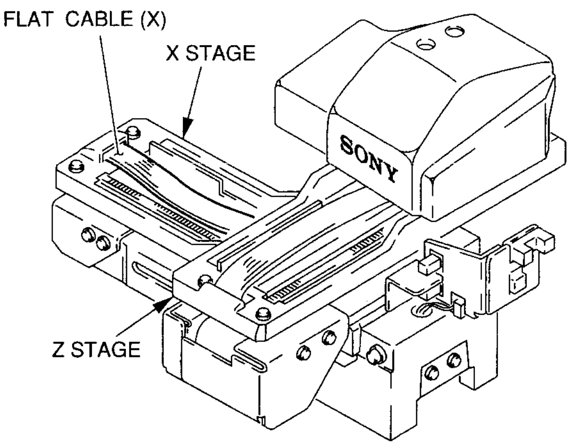

FLAT CABLE (X)
X STAGE
Z STAGE
SONY

Fig. 9-5-21. Flat Cable (X) Replacement

E. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have a harness clamp instead of a harness fixed plate (1). Therefore, the harness fixed plate (1) need not be installed or removed.

**Replacement**

1. Preparation (See section 9-1.)
   - Turn OFF the main power.
   - Hold the counter weight (CW).

2. Remove the elevator assembly. (See section 9-2.)

3. Remove the harness pulley. (See Fig.9-5-22.)
   ① Position the elevator assembly sideways quietly.
   ② Remove screw (A), and remove the HP shaft assembly and harness pulley.

4. Remove the harness fixed plate (1) (See Fig.9-5-22.) Remove screw (B) which fixes harness fixed plate (1).

5. Disconnect connector (CN2) (See Fig.9-5-22.) Disconnect connector (CN2) from the CB-47 board.

6. Remove the belt bracket (1). (See Fig.9-5-23 and Fig.9-5-24.)
   ① Remove two screws (C), and remove the belt bracket (1) from the X base.
   ② Pull out the belt bracket (1) in the direction of arrow (A) till X drive motor can be seen.

7. Disconnect connector (CN1) (See Fig.9-5-23.) Disconnect connector (CN1) from the CB-48 board of Z drive motor portion.

8. Remove the flat cable (X). (See Fig.9-5-24.) Pull out the flat cable (X) in the direction of arrow (B), and then pull out the flat cable (X) in the direction of arrow (C).

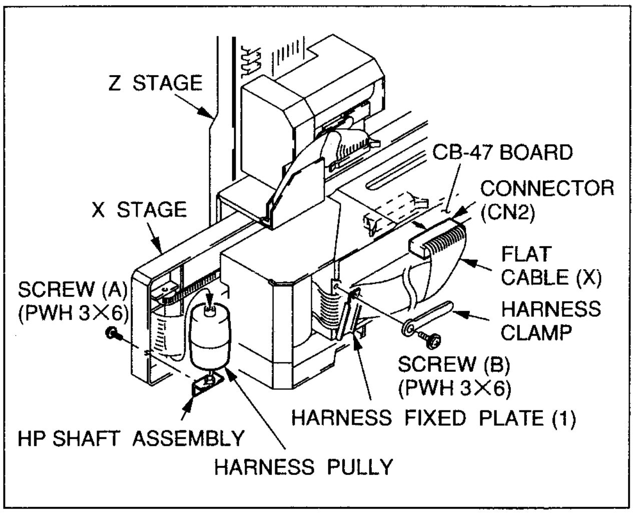

Z STAGE
CB-47 BOARD
CONNECTOR (CN2)
X STAGE
FLAT CABLE (X)
SCREW (A) (PWH 3X6)
HARNESS CLAMP
SCREW (B) (PWH 3X6)
HARNESS FIXED PLATE (1)
HP SHAFT ASSEMBLY
HARNESS PULLY

**Fig. 9-5-22. X Stage Component Removal (1)**

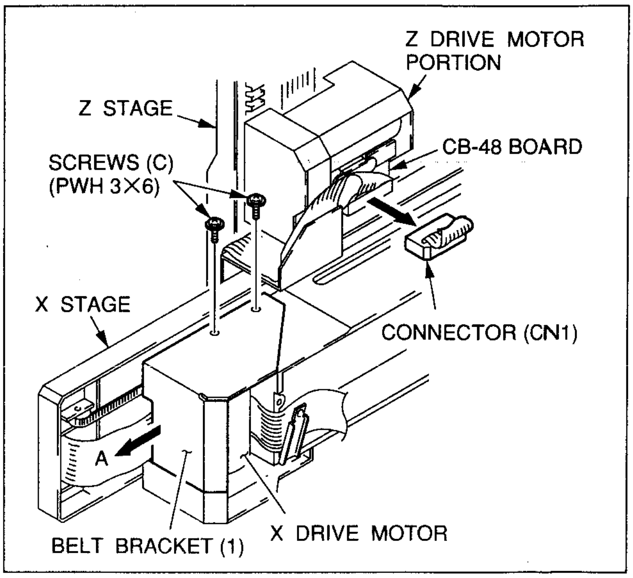

Z DRIVE MOTOR PORTION
Z STAGE
CB-48 BOARD
SCREWS (C) (PWH 3X6)
X STAGE
CONNECTOR (CN1)
A
BELT BRACKET (1)
X DRIVE MOTOR

**Fig. 9-5-23. X Stage Component Removal (2)**

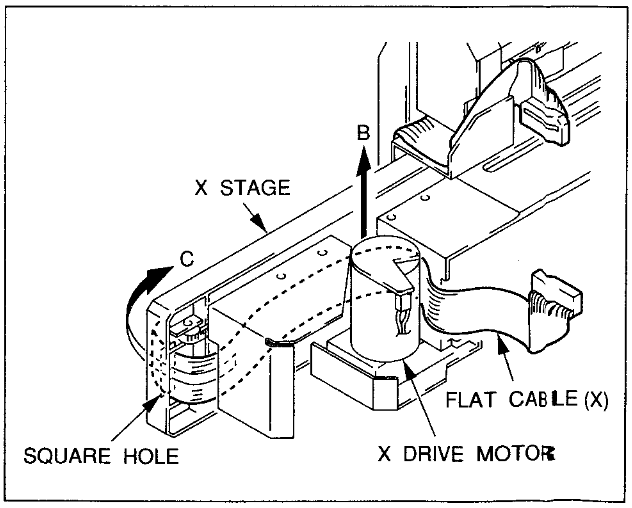

B
X STAGE
C
FLAT CABLE (X)
SQUARE HOLE
X DRIVE MOTOR

**Fig. 9-5-24. Flat Cable (X) Removal**

9. Remove the harness guide assembly. (See Fig. 9-5-25.)
   ① Return the elevator assembly from sideways to horizontally quietly.
   ② Move the Z stage in the direction of arrow (D) fully.
   ③ Remove two screws (D), and remove the harness guide assembly from the Z base.

10. Disassemble the harness guide assembly. (See Fig. 9-5-25.)
   ① Remove screw (E), and remove the harness guide (upper) from the harness guide (lower).
   ② Remove the two screws (F), then remove the harness fixed plate (2). Otherwise, remove the screw (F), then remove the harness clamp.
   ③ Remove the harness clamper.
   **Note:** Machines having serial numbers 10169 (for UC) /20091 (for EK) and former have no harness clamper.
   ④ Remove the flat cable (X).

11. Replace the flat cable (X).

12. Bend the flat cable (X). (See Fig.9-5-26.)
   ① Bend the new flat cable (X) as shown in the figure.

**(Reference)**

Bend the new flat cable in the dimension and degree as shown in the figure with referring the removed flat cable (X).

**Note:** The bending dimensions of flat cables depend on the serial number of the machine.

   ② The flat cable has directionality, so exercise caution in the direction (monotone side and some colors side) of bending.

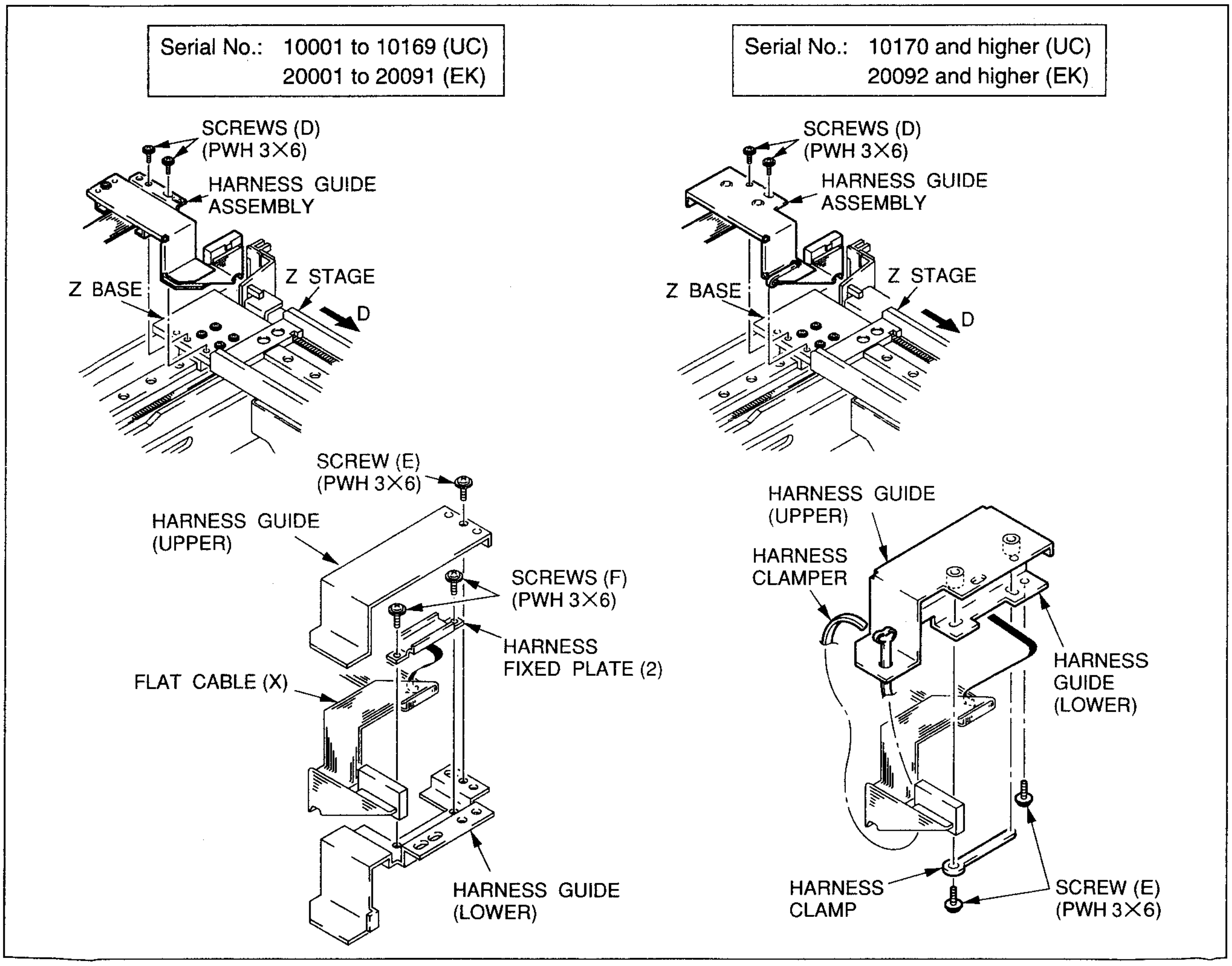
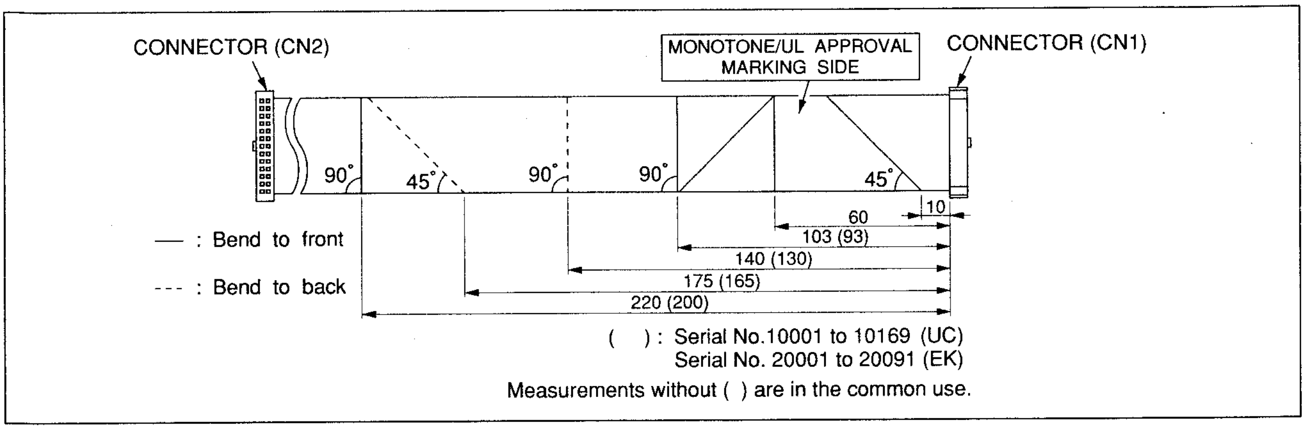

Serial No.: 10001 to 10169 (UC)
20001 to 20091 (EK)
SCREWS (D)
(PWH 3X6)
HARNESS GUIDE
ASSEMBLY
Z BASE
Z STAGE
D
SCREW (E)
(PWH 3X6)
HARNESS GUIDE
(UPPER)
SCREWS (F)
(PWH 3X6)
HARNESS
FIXED PLATE (2)
FLAT CABLE (X)
HARNESS GUIDE
(LOWER)
Serial No.: 10170 and higher (UC)
20092 and higher (EK)
SCREWS (D)
(PWH 3X6)
HARNESS GUIDE
ASSEMBLY
Z BASE
Z STAGE
D
HARNESS GUIDE
(UPPER)
HARNESS
CLAMPER
HARNESS
GUIDE
(LOWER)
HARNESS
CLAMP
SCREW (E)
(PWH 3X6)

**Fig. 9-5-25. Harness Guide Assembly Removal**

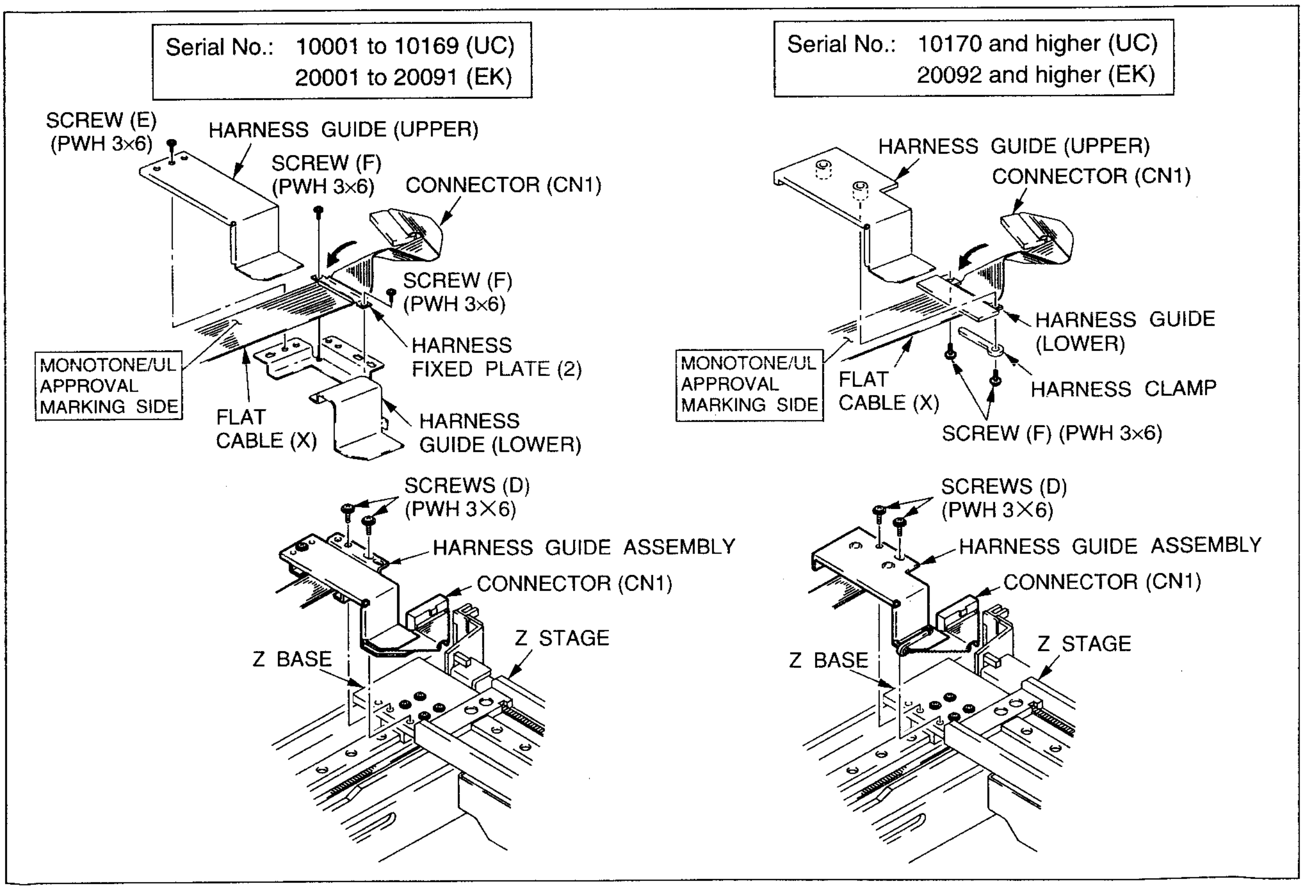

CONNECTOR (CN2)
MONOTONE/UL APPROVAL MARKING SIDE
CONNECTOR (CN1)
90°
45°
90°
90°
45°
10
60
103 (93)
140 (130)
175 (165)
220 (200)
— : Bend to front
--- : Bend to back

( ) : Serial No.10001 to 10169 (UC)
Serial No. 20001 to 20091 (EK)
Measurements without ( ) are in the common use.

Fig. 9-5-26. Flat Cable (X) Bending

13. Assemble the harness guide assembly.
   ① Set the position of the harness fixed plate (2) or harness guide (lower) to the bent flat cable (X) shown in the figure.
   **Note:** The flat cable (X) has directionality. Affix the flat cable (X) so that monotone (blue) side will look outside.
   ② Attach the flat cable (X) and harness fixed plate (2) to the harness guide (lower) as shown in the figure.
   ③ Install the harness fixed plate (2) with the two screws (F).
   Otherwise, install the harness clamp with the screw (F).
   **Note:** Confirm that flat cable (X) is fitted in the convexity of the harness fixed plate (2), then tighten the screws.
   ④ Install the harness guide (upper) with screw (E).

14. Install the harness guide assembly. (See Fig.9-5-27.)
Install the harness guide assembly to the Z base with two screws (D).


Serial No.: 10001 to 10169 (UC)
20001 to 20091 (EK)

Serial No.: 10170 and higher (UC)
20092 and higher (EK)

SCREW (E)
(PWH 3x6)
HARNESS GUIDE (UPPER)
SCREW (F)
(PWH 3x6)
CONNECTOR (CN1)
SCREW (F)
(PWH 3x6)
HARNESS
FIXED PLATE (2)
MONOTONE/UL
APPROVAL
MARKING SIDE
FLAT
CABLE (X)
HARNESS
GUIDE (LOWER)
HARNESS GUIDE (UPPER)
CONNECTOR (CN1)
HARNESS GUIDE
(LOWER)
MONOTONE/UL
APPROVAL
MARKING SIDE
FLAT
CABLE (X)
HARNESS CLAMP
SCREW (F) (PWH 3x6)
SCREWS (D)
(PWH 3X6)
HARNESS GUIDE ASSEMBLY
CONNECTOR (CN1)
Z STAGE
Z BASE
SCREWS (D)
(PWH 3X6)
HARNESS GUIDE ASSEMBLY
CONNECTOR (CN1)
Z STAGE
Z BASE

Fig. 9-5-27. Harness Guide Assembly/Installation

15. Install the flat cable (X). (See Fig.5-9-29.)
    ① Position the elevator assembly sideways quietly.
    ② Install the flat cable (X) through the X stage side to the X base in the reverse order to step 8.

16. Install the belt bracket (1) (See Fig.9-5-30.)
    ① Insert the flat cable (X) to the installing portion of the harness fixed plate (1).
    ② Install the belt bracket (1) to the X base with two screws (C).

17. Connect connector (CN1 and CN2) (See Fig.9-5-30.)
    ① Connect connector (CN1) to the CB-48 board.
    ② Connect connector (CN2) to the CB-47 board.

18. Install the harness fixed plate (1) (See Fig.9-5-30.)
    Install the harness fixed plate (1) and harness clamp with screw (B).

19. Install the harness pulley. (See Fig.9-5-30.)
    ① Fit the harness pulley to the HP shaft assembly.
    ② Put the HP shaft assembly which is assembled in step ① in the shaft of the belt shaft assembly.
    ③ Fit two protrusions of the Z stage to the guide holes of the HP shaft assembly correctly, and install with screw (A).

20. Install the elevator assembly.
    (See section 9-2.)

21. Release the CW holding.
    (See section 9-1-2.)

22. Perform the elevator parallel check and adjustment.
    (See section 9-1-4.)

23. Turn ON the main power.

24. Operation check
    Execute the automatic test mode of the test mode.
    (See the test mode in section 5.)
    **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

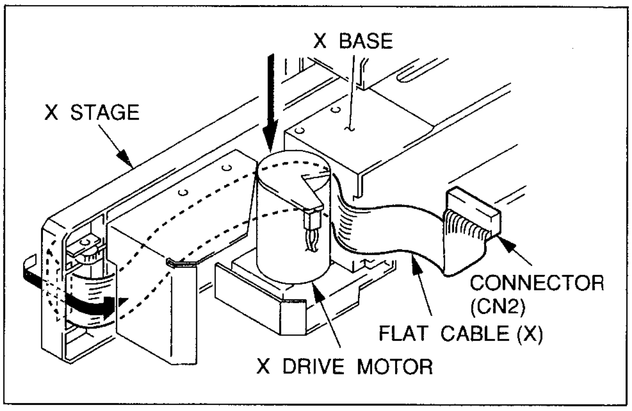

X BASE
X STAGE
CONNECTOR (CN2)
FLAT CABLE (X)
X DRIVE MOTOR

**Fig. 9-5-29. Flat Cable (X) Installation**

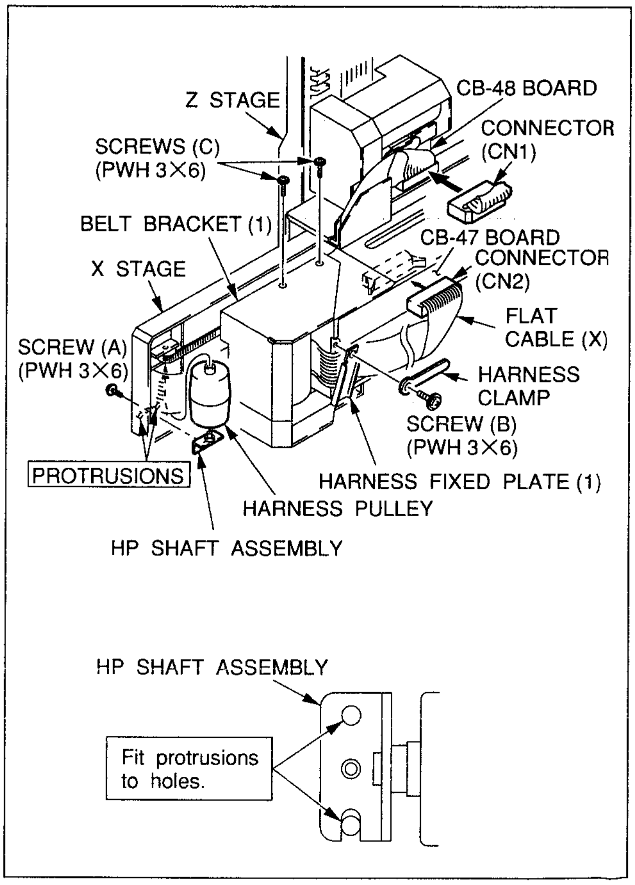

Z STAGE
CB-48 BOARD
CONNECTOR (CN1)
SCREWS (C) (PWH 3X6)
BELT BRACKET (1)
CB-47 BOARD
CONNECTOR (CN2)
X STAGE
FLAT CABLE (X)
SCREW (A) (PWH 3X6)
HARNESS CLAMP
SCREW (B) (PWH 3X6)
PROTRUSIONS
HARNESS FIXED PLATE (1)
HARNESS PULLEY
HP SHAFT ASSEMBLY
HP SHAFT ASSEMBLY
Fit protrusions to holes.

**Fig. 9-5-30. Component Installation**

## Ⅱ. [Y origin sensor replacement]

### Replacement

1. Preparation (See section 9-1.)
   Turn OFF the main power.
   Hold the counter weight (CW).

2. Remove the elevator assembly.
   (See section 9-2.)

3. Remove screw (B), and remove the SE-196 board.

4. Disconnect the 3P connector from the SE-196 board.

5. Replace the Y origin sensor with a new one, and connect the 3P connector to the SE-196 board.

6. Install the SE-196 board to the Y sensor fixed plate with screw (B) while pressing in the direction of the arrow as shown in the figure.
   Tightening torque : 0.8 N·m {8 kgf·cm}
   **Notes:** ① Confirm that there is no clearance between the edge of the Y sensor fixed plate and Y origin sensor.
   ② Y sensor fixed plate determines the height of the Y origin sensor. Except when it is required, do not remove the sensor fixed plate or loosen the screw. When removal or loosing of the screw is performed, perform the Y sensor height adjustment with seeing section 9-1-5.

7. Install the elevator assembly.
   (See section 9-2.)

8. Release the CW holding.
   (See section 9-1-2.)

9. Turn ON the main power.

10. Operation check
    Execute the automatic test mode of the test mode.
    (See the test mode in section 5.)
    **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

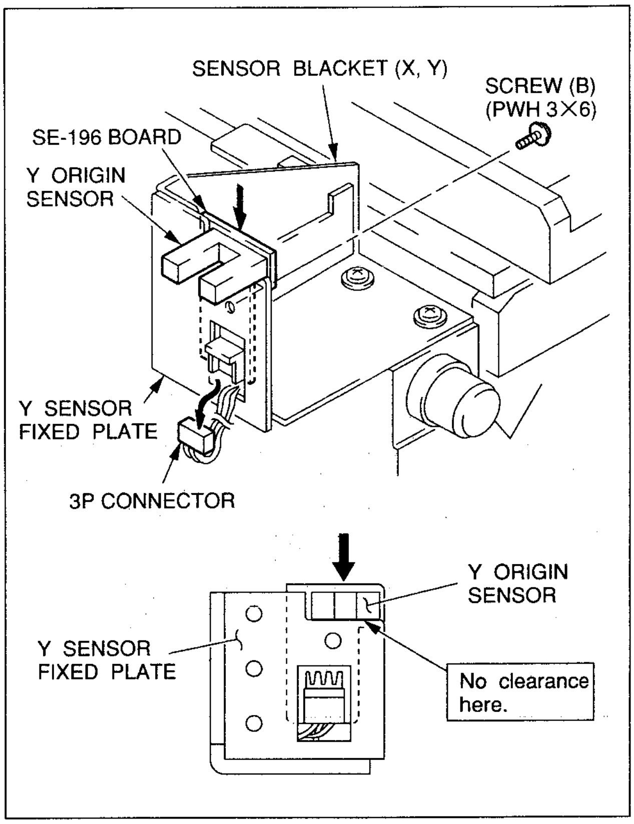

SENSOR BLACKET (X, Y)
SCREW (B)
(PWH 3X6)
SE-196 BOARD
Y ORIGIN SENSOR
Y SENSOR FIXED PLATE
3P CONNECTOR
Y ORIGIN SENSOR
Y SENSOR FIXED PLATE
No clearance here.

**Fig. 9-5-33. Y Origin Sensor Replacement**

## Ⅲ. [Z origin sensor replacement]

### Replacement

1. Preparation (See section 9-1.)
   - Turn OFF the main power.
   - Hold the counter weight (CW).

2. Remove the elevator assembly.
   (See section 9-2.)

3. Remove the hand assembly.
   (See section 9-3.)

4. Remove screw (C), and remove the SE-196 board.

5. Disconnect the 3P connector from the SE-196 board.

6. Replace the Z origin sensor with a new one, and connect the 3P connector to the SE-196 board.

7. Install the SE-196 board to the base assembly with screw (C) while pressing in the direction of the arrow as shown in the figure.
   Tightening torque: 0.8 N·m {8 kgf·cm}

8. Install the hand assembly.
   (See section 9-3.)

9. Install the elevator assembly.
   (See section 9-2.)

10. Release the CW holdng.
    (See section 9-1-2.)

11. Turn ON the main power.

12. Operation check
    Execute the automatic test mode of the test mode.
    (See the test mode in section 5.)
    **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

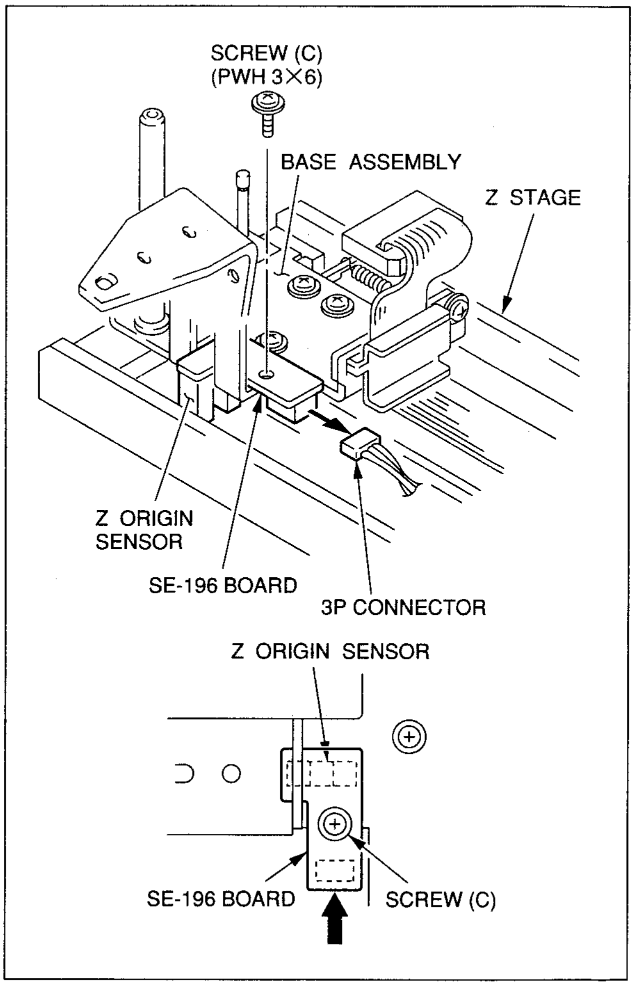

SCREW (C)
(PWH 3×6)
BASE ASSEMBLY
Z STAGE
Z ORIGIN SENSOR
SE-196 BOARD
3P CONNECTOR
Z ORIGIN SENSOR
SE-196 BOARD
SCREW (C)

**Fig. 9-5-34. Z Origin Sensor Replacement**

### 9-5-7. Timing Belt (X)/(Z) Replacement

**Preliminary Information**

A. The timing belt (X) and (Z) is the same part. Each part name is used properly in this section for explanation of the how to replace.

B. Timing belt (X) and (Z) replacements are performed by removing the elevator assembly from the Y drive block.

C. Read the general information for part replacement in section 9-1. before replacing the timing belt (X) or (Z).

D. Prepare the following tools for replacement.
- Phillips screwdriver No. 2 (for M3 to M5)
- Locking compound
- Pliers (or tweezers)

E. The replacement flowchart is shown below.

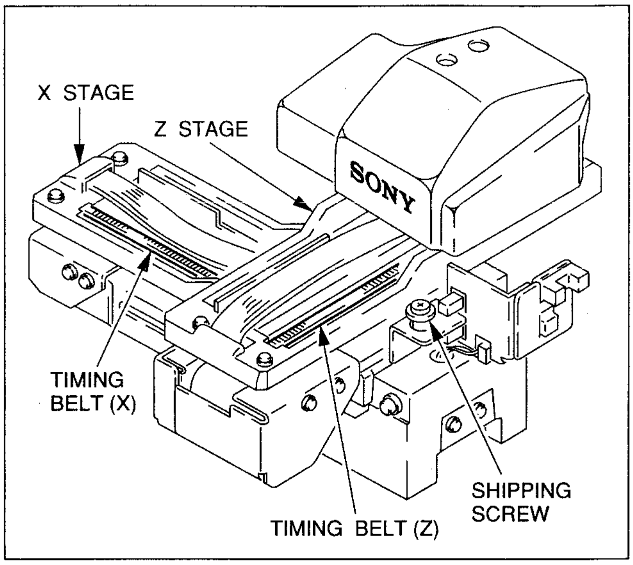
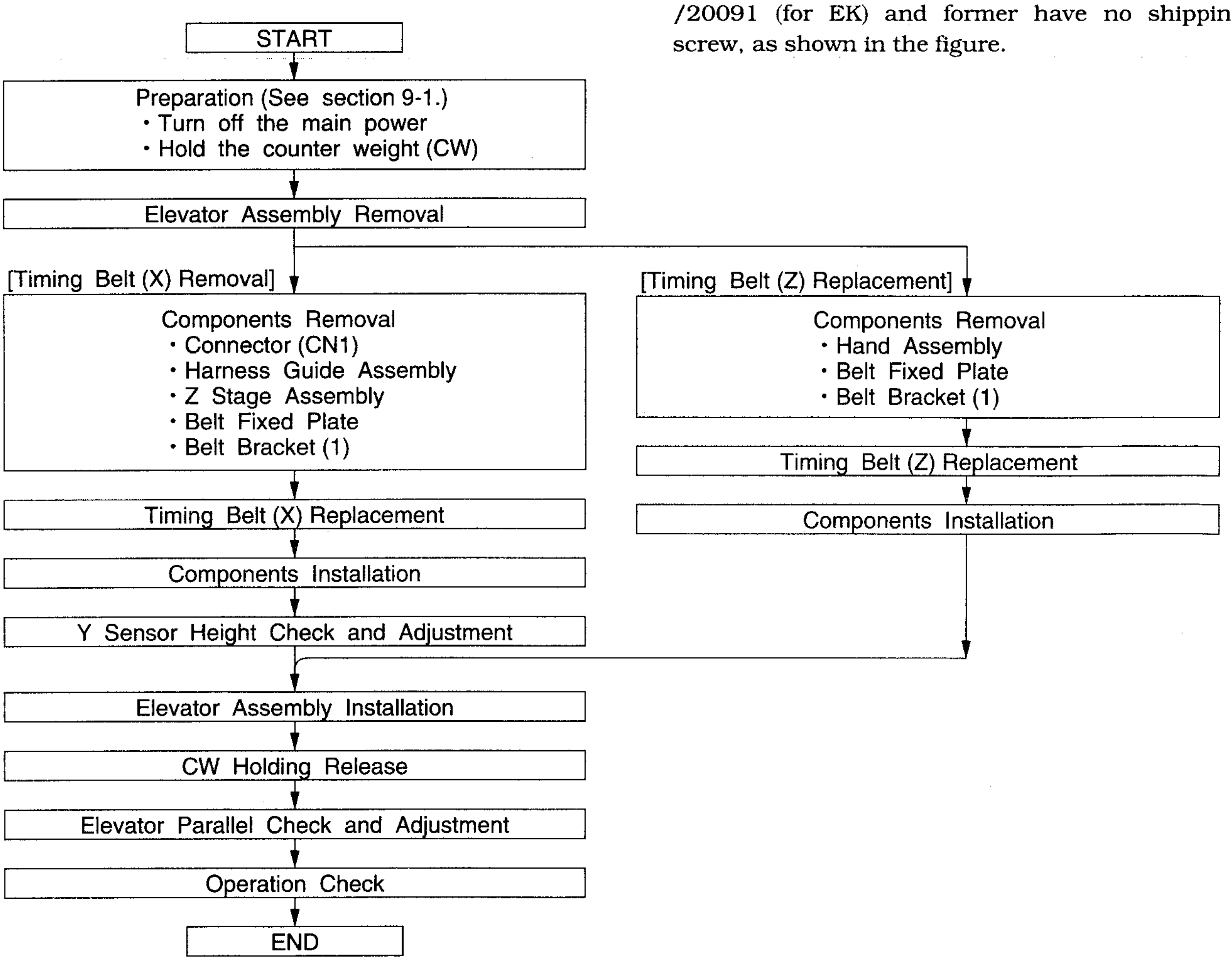

X STAGE
Z STAGE
SONY
TIMING BELT (X)
SHIPPING SCREW
TIMING BELT (Z)

**Fig. 9-5-35. Timing Belt (X), (Z) Replacement**

F. Machines having serial numbers 10169 (for UC) /20091 (for EK) and former have no shipping screw, as shown in the figure.


START
Preparation (See section 9-1.)
• Turn off the main power
• Hold the counter weight (CW)
Elevator Assembly Removal
[Timing Belt (X) Removal]
Components Removal
• Connector (CN1)
• Harness Guide Assembly
• Z Stage Assembly
• Belt Fixed Plate
• Belt Bracket (1)
Timing Belt (X) Replacement
Components Installation
Y Sensor Height Check and Adjustment
[Timing Belt (Z) Replacement]
Components Removal
• Hand Assembly
• Belt Fixed Plate
• Belt Bracket (1)
Timing Belt (Z) Replacement
Components Installation
Elevator Assembly Installation
CW Holding Release
Elevator Parallel Check and Adjustment
Operation Check
END

## [Timing belt (X) replacement]

### Replacement

1. Preparation (See section 9-1.)
   - Turn OFF the main power.
   - Hold the counter weight (CW).
2. Remove the elevator assembly.
   (See section 9-2.)
3. Disconnect connector (CN1).
   Disconnect connector (CN1) from the CB-48 board of the Z drive motor part. (See section 9-5-5.)
4. Remove the harness guide assembly.
   (See Fig. 9-5-36.)
   ① Move the Z stage in the direction of arrow A.
   ② Remove two screws (A), and remove the harness guide assembly with the flat cable.
5. Remove the Z stage assembly. (See Fig. 9-5-36.)
   Remove four screws (B), and remove the Z stage assembly.
   **Note:** Exercise caution so as not to lose the spacer.
6. Remove the belt fixed plate. (See Fig. 9-5-37.)
   ① Unhook one side of tension spring which hooks between belt pad plate (1) and (2).
   ② Remove four screws (C). And remove the belt pad plates (1) and (2). Then remove the two belt fixed plates.
7. Remove the belt bracket (1). (See Fig. 9-5-37.)
   ① Remove two screws (D).
   ② Pull the timing belt (X) with the belt bracket (1) out of the X stage.

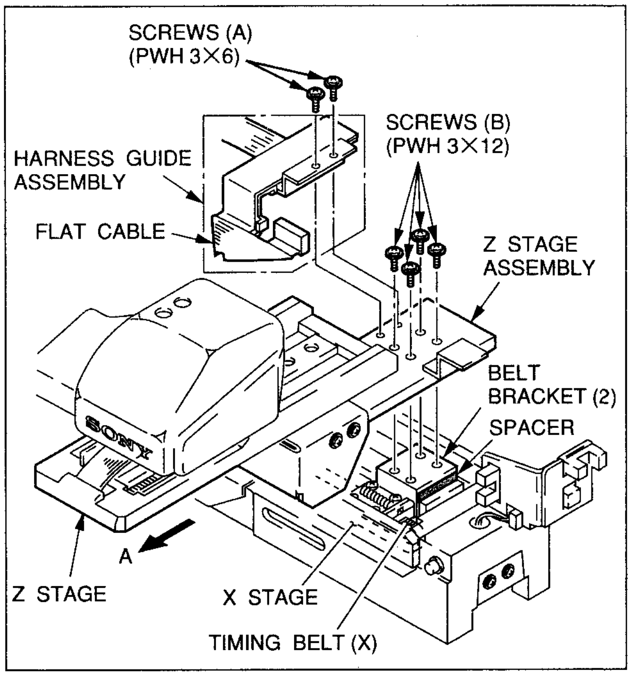

SCREWS (A)
(PWH 3X6)
SCREWS (B)
(PWH 3X12)
HARNESS GUIDE
ASSEMBLY
FLAT CABLE
Z STAGE
ASSEMBLY
BELT
BRACKET (2)
SPACER
A
Z STAGE
X STAGE
TIMING BELT (X)

Fig. 9-5-36. Z Stage Assembly Removal

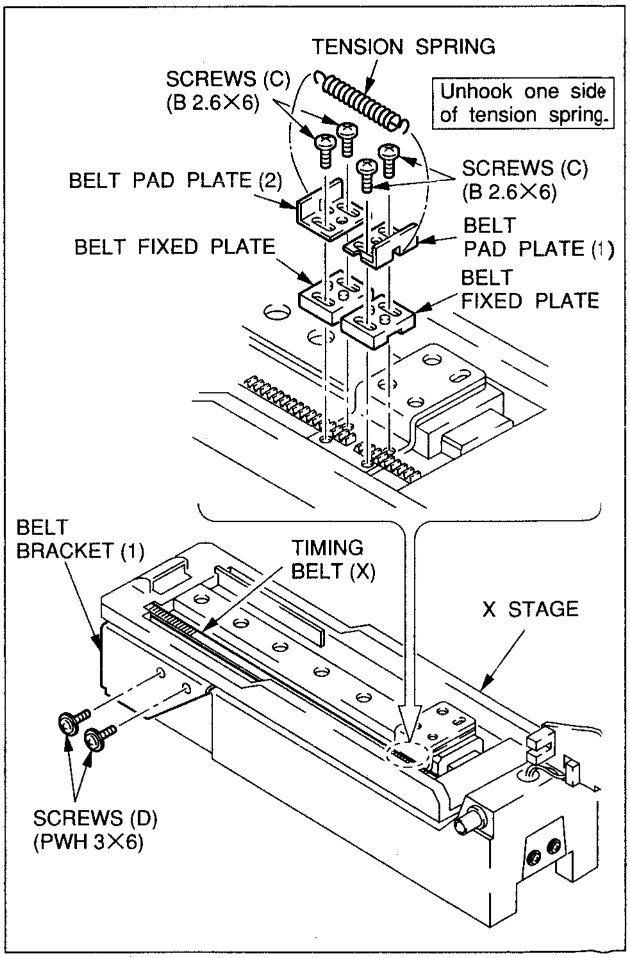

TENSION SPRING
SCREWS (C)
(B 2.6X6)
Unhook one side of tension spring.
BELT PAD PLATE (2)
SCREWS (C)
(B 2.6X6)
BELT FIXED PLATE
BELT
PAD PLATE (1)
BELT
FIXED PLATE
BELT
BRACKET (1)
TIMING
BELT (X)
X STAGE
SCREWS (D)
(PWH 3X6)

Fig. 9-5-37. Timing Belt (X) Removal (1)

12. Install the timing belt (X). (3) (See Fig. 9-5-42.)
   ① Align the belt fixed plate and belt pad plate (1) with the end of the timing belt of the belt pad plate (1) side as shown in the figure.
   ② Install the timing belt (X) to the belt bracket (2) with two screws (C).
   Tightening torque: 0.5 N·m {5 kgf·cm}
   ③ Align the belt fixed plate and belt pad plate (2) with the end of the timing belt of the belt pad plate (2) side as shown in the figure.
   ④ Install the timing belt (X) to the belt bracket (2) temporarily with two screws (C).
   ⑤ Hook the tension spring between belt pad plate (1) and (2).
   ⑥ Tighten two screws (C) of the belt pad plate (2) side.
   Tightening torque: 0.5 N·m {5 kgf·cm}
   ⑦ Apply locking compound slightly to four screws (C).

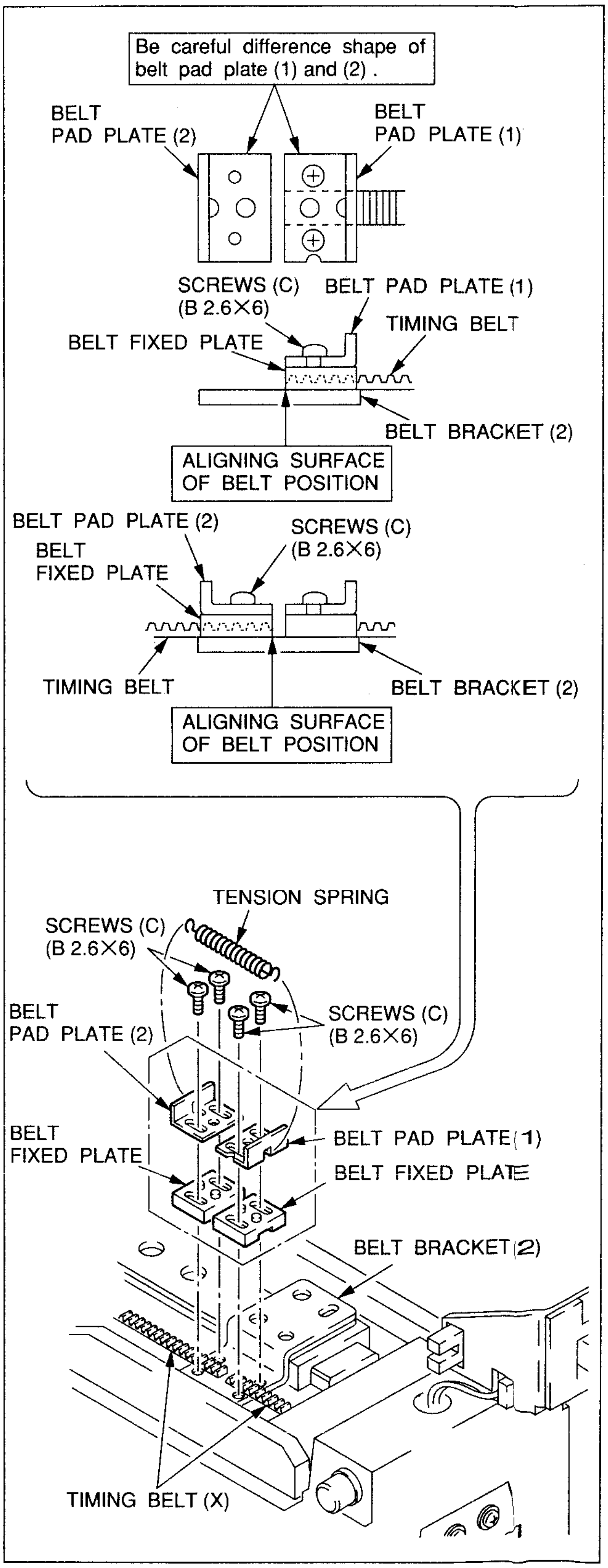

Be careful difference shape of belt pad plate (1) and (2).
BELT PAD PLATE (2)
BELT PAD PLATE (1)
SCREWS (C) (B 2.6X6)
BELT PAD PLATE (1)
TIMING BELT
BELT FIXED PLATE
BELT BRACKET (2)
ALIGNING SURFACE OF BELT POSITION
BELT PAD PLATE (2)
SCREWS (C) (B 2.6X6)
BELT FIXED PLATE
TIMING BELT
BELT BRACKET (2)
ALIGNING SURFACE OF BELT POSITION
TENSION SPRING
SCREWS (C) (B 2.6X6)
BELT PAD PLATE (2)
SCREWS (C) (B 2.6X6)
BELT FIXED PLATE
BELT PAD PLATE (1)
BELT FIXED PLATE
BELT BRACKET (2)
TIMING BELT (X)

**Fig. 9-5-42. Timing Belt (X) Installation (3)**

13. Install the Z stage assembly. (See Fig. 9-5-43.)

① Put the slider, spacer and belt bracket (2) on the linear way of the X stage, and align the screw holes.

② Put the Z stage on the X stage as shown in the figure, and thread four screws (B) snugly but do not tighten.

③ Loosen shipping screw of the shutter plate assembly.

**Note:** Machines having serial numbers 10169 (for UC) /20091 (for EK) and former have no shipping screw.

④ Remove screw (F), and remove the shutter plate.

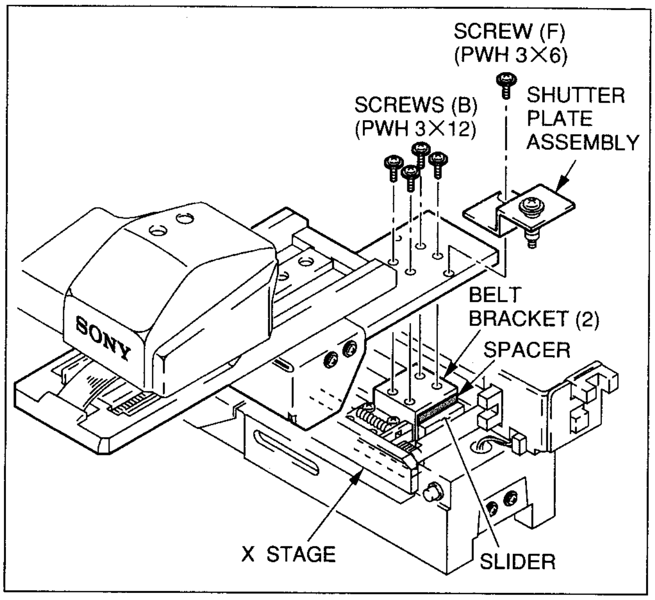

SCREW (F)
(PWH 3X6)
SCREWS (B)
(PWH 3X12)
SHUTTER
PLATE
ASSEMBLY
BELT
BRACKET (2)
SPACER
X STAGE
SLIDER

Fig. 9-5-43. Z Stage Assembly Installation (1)

④ Strike the right edge of the Z base into the protrusions (A) and (B). Tighten four screws (B). Tightening torque: 0.8 N·m {8 kgf·cm}

⑤ Strike the right edge of the Z base into the protrusions (A) and (B) again. Confirm that there are no clearance between the right edge of the Z base and protrusions.

- When there are no clearance, apply locking compound slightly to four screws (B).
- When there are clearance, loosen four screws (B), and perform on step ④ and after.

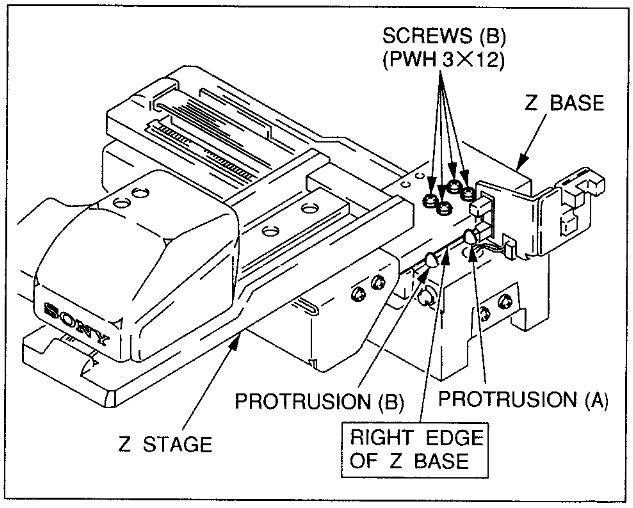

SCREWS (B)
(PWH 3X12)
Z BASE
PROTRUSION (B)
PROTRUSION (A)
Z STAGE
RIGHT EDGE
OF Z BASE

Fig. 9-5-44. Z Stage Assembly Installation (2)

⑥ Install the shutter plate to the Z base with screw (F).

⑦ Only machines having serial numbers 10170 (for UC) /20092 (for EK) and higher require their shipping screws tightened.

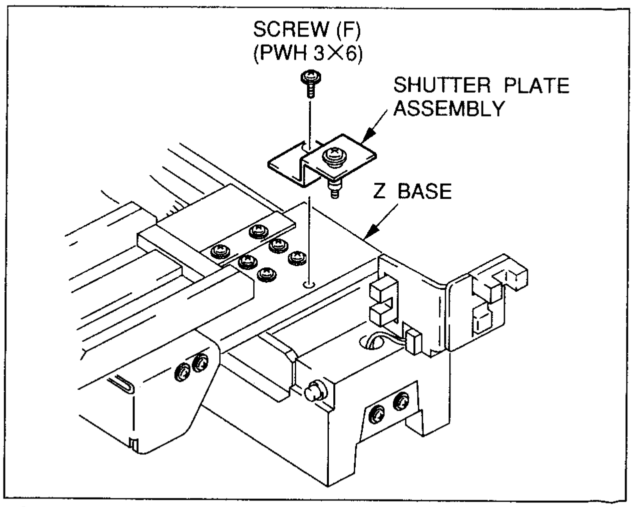

SCREW (F)
(PWH 3X6)
SHUTTER PLATE
ASSEMBLY
Z BASE

Fig. 9-5-45. Z Stage Assembly Installation (3)

11. Replace and Install the linear ways (X) [upper/lower]. (See Fig. 9-5-59.)
    ① Put the X stage between the new replaced linear way [upper] and linear way stopper rail, and thread it three screws (F) and one screw (G) but do not tighten them.
    ② The linear way [upper] has directionality. Align the arrow direction on the linear way [upper] with the direction of standard projections (A) and (B) on the X stage.
    ③ Press the linear way [upper] against the standard projections (A) and (B), and tighten it with three screws (F) and one screw (G).
    Tightening torque: 0.8 N·m {8 kgf·cm}
    ④ The linear way [lower] has directionality. Align the arrow direction on the linear way [lower] with the direction of standard projections (C) and (D).
    ⑤ Press the linear way [lower] against the standard projections (C) and (D), and tighten it with three screws (E).
    Tightening torque: 0.8N·m {8kgf·cm}
    ⑥ Apply locking compound slightly to three screws (E).

12. Install the X stage.
    Install the X stage in the reverse order to step 9.

13. Install the timing belt (X).
    (See steps 11 and 12 in section 9-5-7. "Timing belt (X) replacement")
    But, do not tighten the screws which install the belt bracket (1) at this time.
    These screws are tightened at step 15.

14. Install the Z stage assembly.
    (See section 9-5-7.)

15. Connect the flat cable (X).
    Connect the flat cable (X) in the reverse order to step 4.

16. Install the harness pulley.
    (See section 9-5-5.)

17. Perform the Y sensor height check and adjustment.
    (See section 9-1-5.)

18. Install the elevator assembly.
    (See section 9-2.)

19. Release the CW holding.
    (See section 9-1-2.)

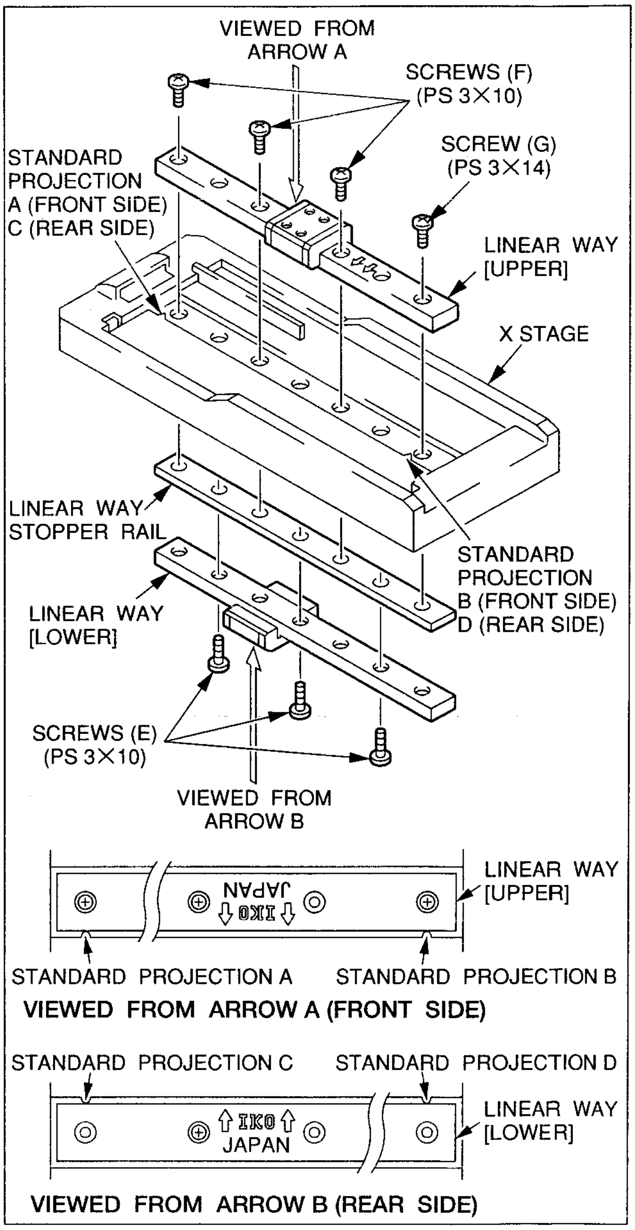

VIEWED FROM
ARROW A
SCREWS (F)
(PS 3X10)
SCREW (G)
(PS 3X14)
STANDARD
PROJECTION
A (FRONT SIDE)
C (REAR SIDE)
LINEAR WAY
[UPPER]
X STAGE
LINEAR WAY
STOPPER RAIL
STANDARD
PROJECTION
B (FRONT SIDE)
D (REAR SIDE)
LINEAR WAY
[LOWER]
SCREWS (E)
(PS 3X10)
VIEWED FROM
ARROW B
JAPAN
IKO
LINEAR WAY
[UPPER]
STANDARD PROJECTION A
STANDARD PROJECTION B
VIEWED FROM ARROW A (FRONT SIDE)
STANDARD PROJECTION C
STANDARD PROJECTION D
IKO
JAPAN
LINEAR WAY
[LOWER]
VIEWED FROM ARROW B (REAR SIDE)

**Fig. 9-5-59. Linear Way (X) Replacement**

20. Perform the elevator parallel check and adjustment.
    (See section 9-1-4.)

21. Turn ON the main power.

22. Operation check
    Execute the automatic test mode of the test mode.
    (See the test mode in section 5.)
    **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

### 9-5-9. Linear Way (Z) Replacement

**Preliminary Information**

A. The two linear ways (Z) are used the upper and lower side of the Z stage. The replacement procedures of the linear ways (Z) are the same as it of the linear ways (X). Read Preliminary Information in section 9-5-8.

B. This part replacement is performed by removing the hand assembly from the elevator assembly.

C. After installing the Z stage, perform the Z rail clearance check.

D. Prepare the following tools for replacement.
- Spanner (for N3) (5.3 mm)
- Locking compound

E. The replacement flowchart is shown below.

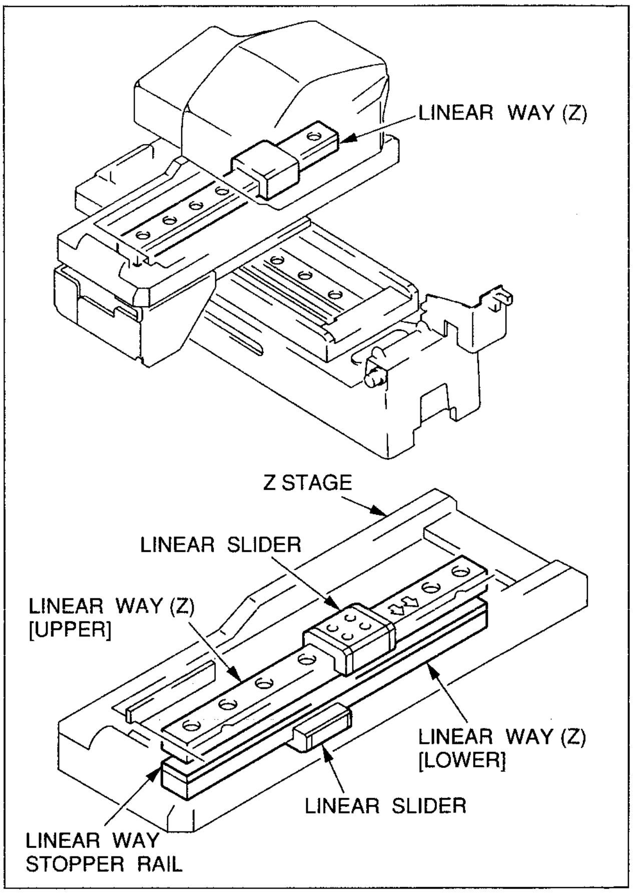
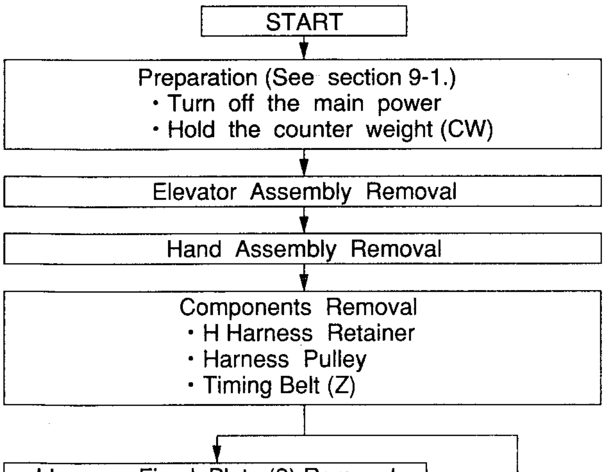
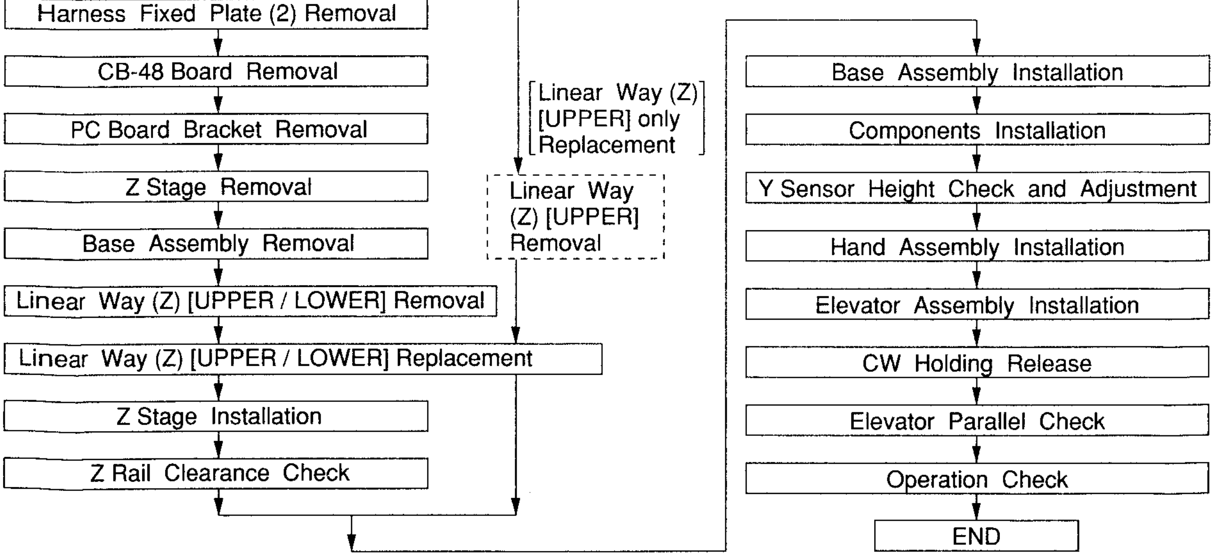

LINEAR WAY (Z)
Z STAGE
LINEAR SLIDER
LINEAR WAY (Z) [UPPER]
LINEAR WAY (Z) [LOWER]
LINEAR SLIDER
LINEAR WAY STOPPER RAIL

**Fig. 9-5-60. Linear Way (Z) Replacement**

F. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have a cable clamper instead of a harness fixed plate (2). Therefore, the harness fixed plate (2) need not be installed or removed.


START
Preparation (See section 9-1.)
• Turn off the main power
• Hold the counter weight (CW)
Elevator Assembly Removal
Hand Assembly Removal
Components Removal
• H Harness Retainer
• Harness Pulley
• Timing Belt (Z)


Harness Fixed Plate (2) Removal
CB-48 Board Removal
PC Board Bracket Removal
Z Stage Removal
Base Assembly Removal
Linear Way (Z) [UPPER / LOWER] Removal
Linear Way (Z) [UPPER] only Replacement
Linear Way (Z) [UPPER] Removal
Linear Way (Z) [UPPER / LOWER] Replacement
Z Stage Installation
Z Rail Clearance Check
Base Assembly Installation
Components Installation
Y Sensor Height Check and Adjustment
Hand Assembly Installation
Elevator Assembly Installation
CW Holding Release
Elevator Parallel Check
Operation Check
END

13. Replace and install the linear ways (Z) [upper/lower]. (See Fig. 9-5-65.)
    ① Position the new linear way [upper] and linear way stopper rail to the Z stage as shown in the figure. Thread it the three screws (G) and one screw (H) but do not tighten them.
    ② The linear way [upper] has directionality. Align the arrow direction on the linear way [upper] with the direction of the standard projections (A) and (B).
    ③ Press the linear way [upper] against the standard projections (A) and (B). Tighten it with three screws (G) and one screw (H).
    Tightening torque: 0.8 N·m {8 kgf·cm}
    ④ The linear way [lower] has directionality. Align the arrow direction on the linear way [lower] with the direction of standard projection (C) and (D).
    ⑤ Put the linear way [lower] against the standard projections (C) and (D), and tighten it with three screws (F).
    Tightening torque: 0.8 N·m {8 kgf·cm}
    ⑥ Apply locking compound slightly to three screws (F).

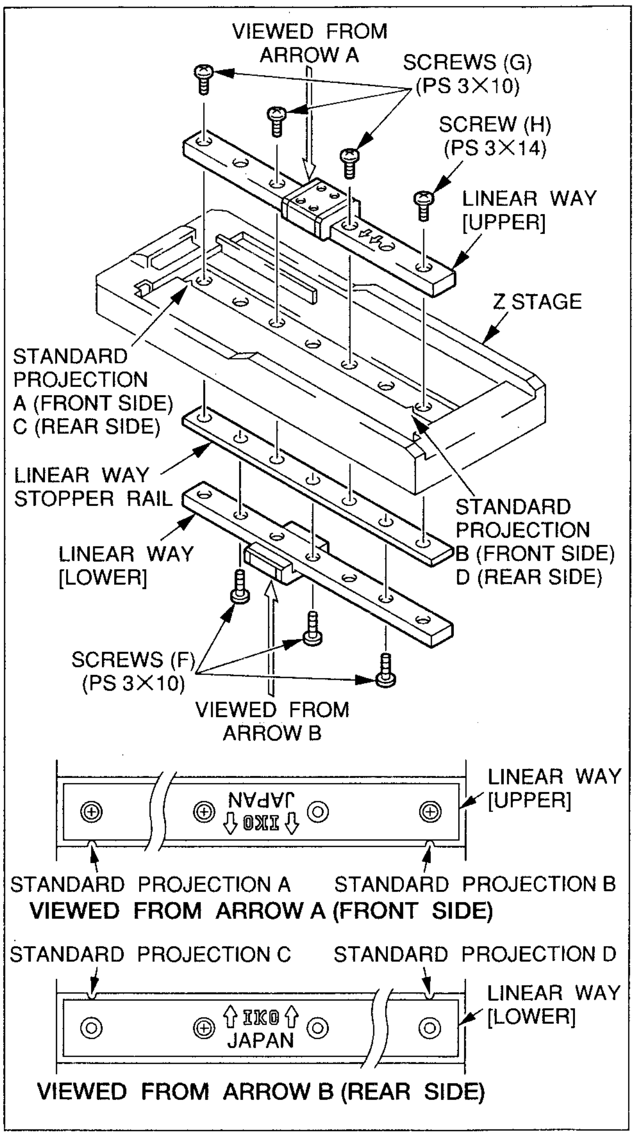

VIEWED FROM ARROW A
SCREWS (G) (PS 3X10)
SCREW (H) (PS 3X14)
LINEAR WAY [UPPER]
Z STAGE
STANDARD PROJECTION A (FRONT SIDE) C (REAR SIDE)
LINEAR WAY STOPPER RAIL
LINEAR WAY [LOWER]
STANDARD PROJECTION B (FRONT SIDE) D (REAR SIDE)
SCREWS (F) (PS 3X10)
VIEWED FROM ARROW B
JAPAN
IKO
LINEAR WAY [UPPER]
STANDARD PROJECTION A
STANDARD PROJECTION B
VIEWED FROM ARROW A (FRONT SIDE)
STANDARD PROJECTION C
STANDARD PROJECTION D
IKO
JAPAN
LINEAR WAY [LOWER]
VIEWED FROM ARROW B (REAR SIDE)

**Fig. 9-5-65. Linear Way (Z) Replacement**

14. Install the Z stage. (See Fig. 9-5-66.)
    ① Install the Z stage to the Z base using four screws (E).
    Tightening torque: 0.8 N·m {8 kgf·cm}
    ② Pull out the both sides of the flat cable (Z) and timing belt (Z) to the front side of the Z stage.

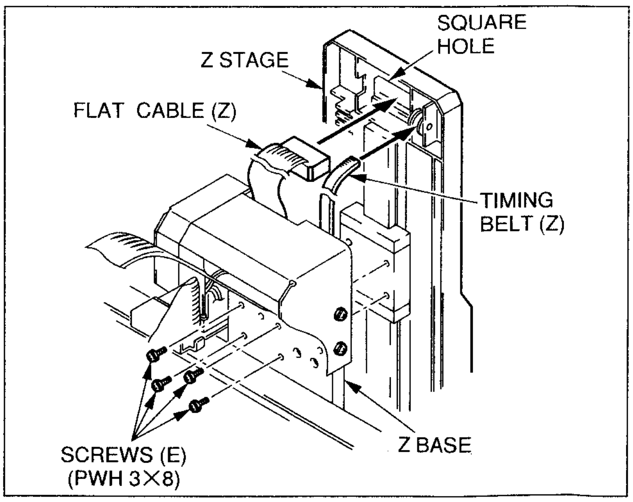

SQUARE HOLE
Z STAGE
FLAT CABLE (Z)
TIMING BELT (Z)
SCREWS (E) (PWH 3X8)
Z BASE

**Fig. 9-5-66. Z Stage Installation**

15. Check Z rail clearance. (See Fig. 9-5-67.)
    Check that there is no clearance between the slider of the linear way [lower] and Z base. (See Fig-1.)
    - When there is no clearance, apply locking compound slightly to four screws (E).
    - When there is clearance, perform the adjustment in the following procedure.
      ① Loosen four screws (E). (See Fig-2.)
      ② Press the slider against the direction of arrow A. Check that there is no clearance between the slider of the linear way [lower] and Z base. (See Fig-1.)
      ③ Tighten four screws (E). (See Fig-2.)
      Tightening torque: 0.8 N·m {8 kgf·m}
      ④ Apply locking compound slightly to four screws (E).

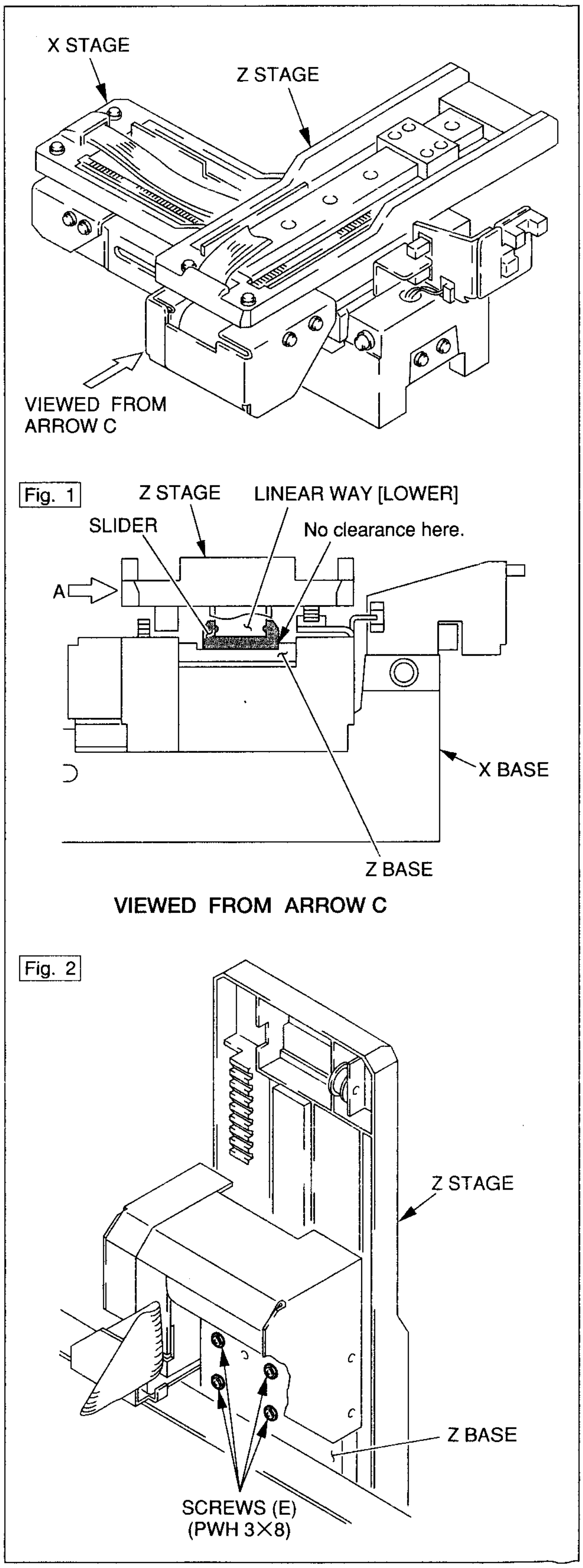

X STAGE
Z STAGE
VIEWED FROM ARROW C
Fig. 1
Z STAGE
LINEAR WAY [LOWER]
SLIDER
No clearance here.
A
X BASE
Z BASE
VIEWED FROM ARROW C
Fig. 2
Z STAGE
Z BASE
SCREWS (E)
(PWH 3X8)

Fig. 9-5-67. Z Rail Clearance Check

16. Install the base assembly. (See Fig. 9-5-68.)
    Install the base assembly and spacer to the linear way [upper] using four screws (A).

17. Install the timing belt (Z).
    (See step 10 in Section 9-5-7. [Timing Belt (Z) Replacement.]

18. Install the PC board bracket.
    Install the PC board bracket in the reverse order to step 9.

19. Install the CB-48 board.
    Install the CB-48 board in the reverse order to step 8.

20. Install the harness fixed plate (2).
    Install the harness fixed plate (2) in the reverse order to step 7.

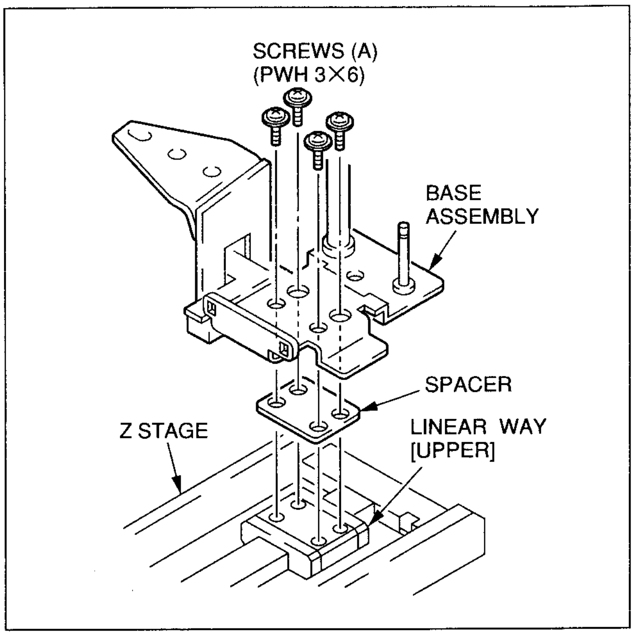


Fig. 9-5-68. Base Assembly Installation

21. Install the harness pulley.
    (See section 9-5-4.)

22. Install the H harness retainer.
    (See section 9-5-4.)

23. Perform the Y sensor height check and adjustment.
    (See section 9-1-5.)

24. Install the hand assembly.
    (See section 9-3.)

25. Install the elevator assembly.
    (See section 9-2.)

26. Release the CW holding.
    (See section 9-1-2.)

27. Perform the elevator parallel check and adjustment.
    (See section 9-1-4. )

28. Turn ON the main power.

29. Operation check
    Execute the automatic test mode of the test mode.
    (See the test mode in Section 5.)
    **Note:** Do not perform the check using the test mode when operating the controlling and controlled units.

## 9-6. Y DRIVE BLOCK COMPONENT REPLACEMENT

### Preliminary Information

A. Y drive block is the block which is removed elevator assembly and Y drive motor assembly from the elevator block. (See Fig.9-6-1.)
   The replacement procedures of Y drive block components are described below.
   9-6-1. Timing Belt (L) Replacement
   9-6-2. Counter Weight Assembly and Counter Weight Rail Replacement
   9-6-3. Elevator Linear Way Replacement
   9-6-4. Flat Cable (ELV-1) Replacement

B. Read the general information for part replacement in section 9-1. before replacing the Y drive block component.

C. This part replacement is performed by removing the elevator assembly.

D. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have some parts whose shapes differ. If parts must be replaced using a different procedure because of the difference in shape, the correct procedure is explained. If no particular replacement procedure is given, use the procedure for other serial numbers.

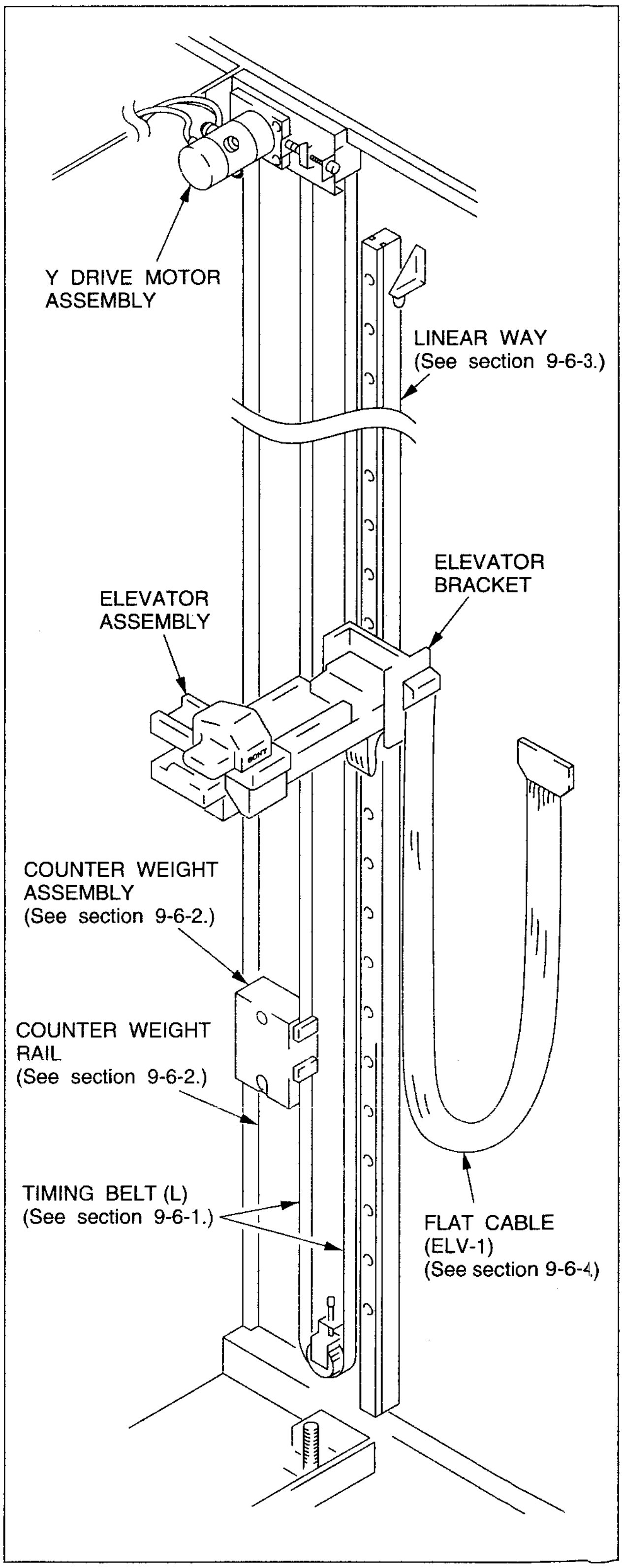

Y DRIVE MOTOR ASSEMBLY
LINEAR WAY (See section 9-6-3.)
ELEVATOR BRACKET
ELEVATOR ASSEMBLY
COUNTER WEIGHT ASSEMBLY (See section 9-6-2.)
COUNTER WEIGHT RAIL (See section 9-6-2.)
TIMING BELT (L) (See section 9-6-1.)
FLAT CABLE (ELV-1) (See section 9-6-4.)

Fig. 9-6-1. Y Drive Block Component Replacement

### 9-6-1. Timing Belt (L) Replacement

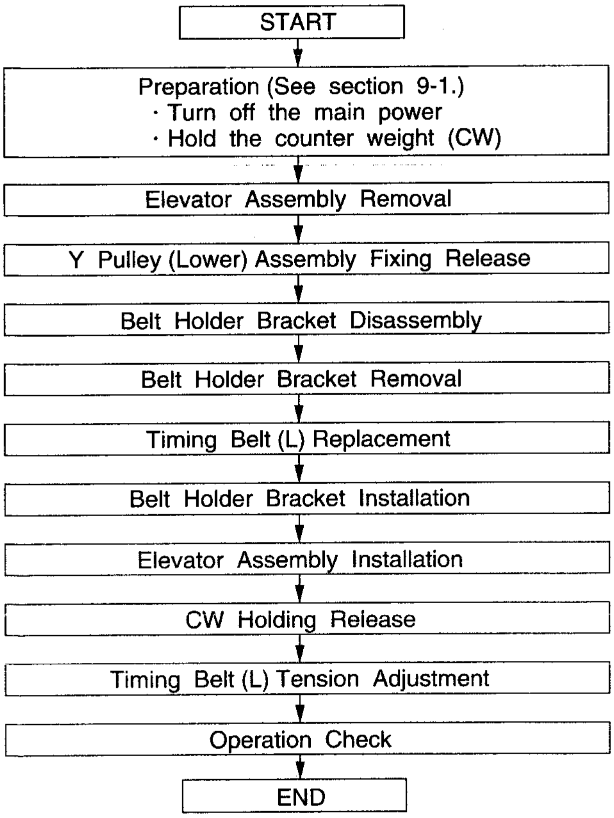
**Preliminary Information**

A. The timing belt (L) is looped with shaft of midway pulley (Y drive motor assembly) and Y pulley (lower) (Y pulley (lower) assembly).
Both ends of the timing belt (L) are attached to the counter weight assembly.

B. Read the general information for part replacement in section 9-1. before replacing the timing belt (L).

C. Prepare the following tools for replacement.
- Phillips screwdriver No. 2 (for M3 to M5)
- Hexagon L wrench driver d: 2.5 and 3 mm

D. The replacement flowchart is shown below.


START
Preparation (See section 9-1.)
· Turn off the main power
· Hold the counter weight (CW)
Elevator Assembly Removal
Y Pulley (Lower) Assembly Fixing Release
Belt Holder Bracket Disassembly
Belt Holder Bracket Removal
Timing Belt (L) Replacement
Belt Holder Bracket Installation
Elevator Assembly Installation
CW Holding Release
Timing Belt (L) Tension Adjustment
Operation Check
END

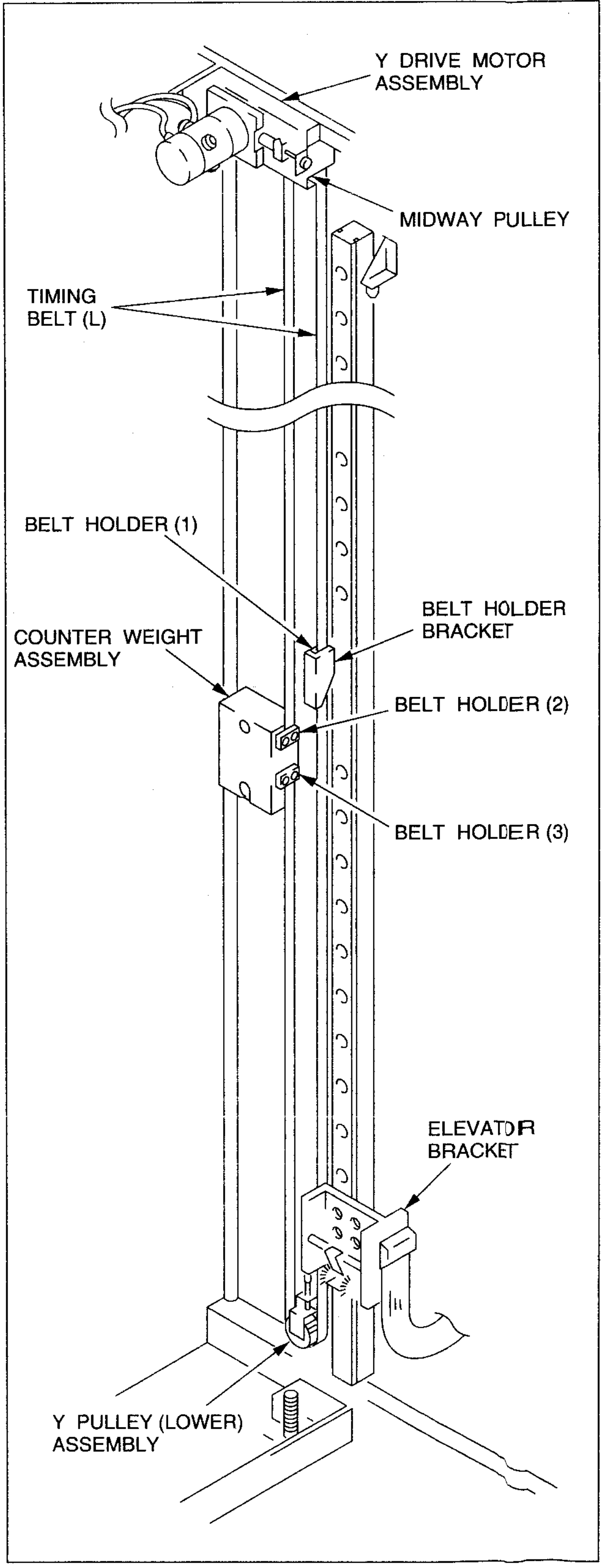

Y DRIVE MOTOR ASSEMBLY
MIDWAY PULLEY
TIMING BELT (L)
BELT HOLDER (1)
BELT HOLDER BRACKET
COUNTER WEIGHT ASSEMBLY
BELT HOLDER (2)
BELT HOLDER (3)
ELEVATOR BRACKET
Y PULLEY (LOWER) ASSEMBLY

Fig. 9-6-2. Timing Belt (L) Replacement

**Replacement**

1. Preparation (See section 9-1.)
   Turn OFF the main power.
   Hold the counter weight (CW).

2. Remove the elevator assembly.
   (See section 9-2.)

3. Y pulley (Lower) assembly fixing release (See Fig. 9-6-3.)
   ① Loosen two screws (A) of the Y pulley (lower) assembly counterclockwise by two turns.
   ② Turn the adjustment screw counterclockwise so that the spring stretches completely.

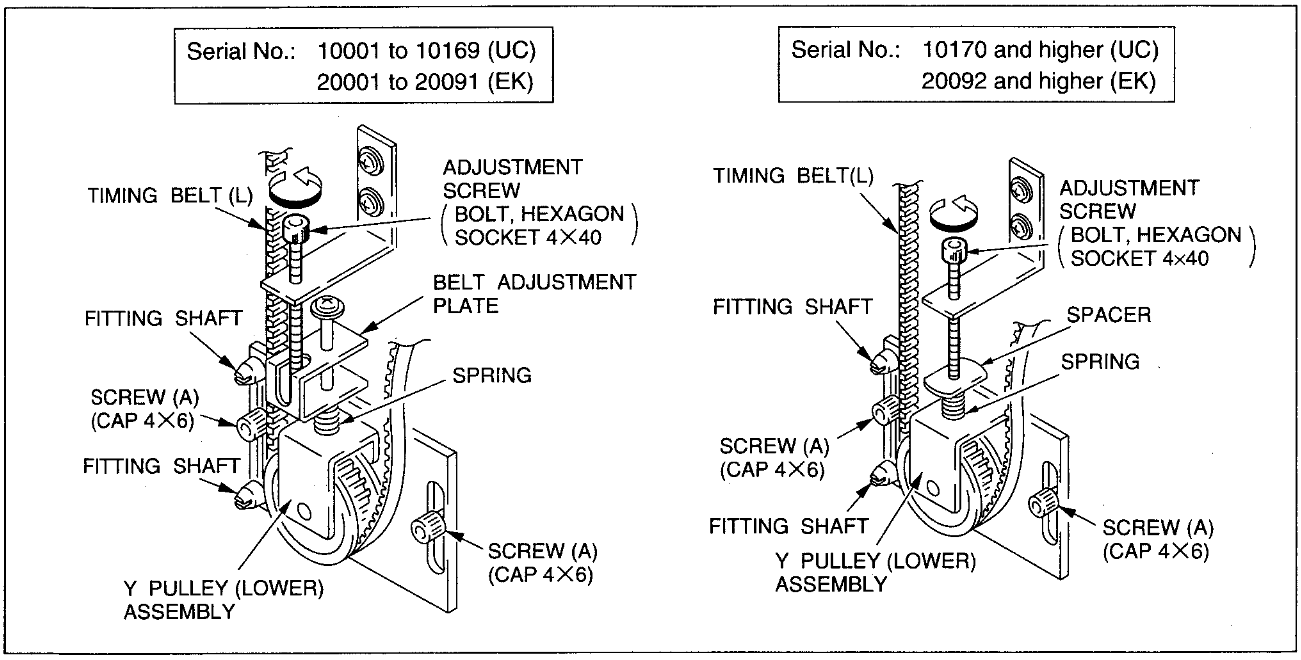

Serial No.: 10001 to 10169 (UC)
20001 to 20091 (EK)
TIMING BELT (L)
ADJUSTMENT SCREW
( BOLT, HEXAGON SOCKET 4X40 )
BELT ADJUSTMENT PLATE
FITTING SHAFT
SPRING
SCREW (A) (CAP 4X6)
FITTING SHAFT
SCREW (A) (CAP 4X6)
Y PULLEY (LOWER) ASSEMBLY
Serial No.: 10170 and higher (UC)
20092 and higher (EK)
TIMING BELT(L)
ADJUSTMENT SCREW
( BOLT, HEXAGON SOCKET 4x40 )
FITTING SHAFT
SPACER
SPRING
SCREW (A) (CAP 4X6)
FITTING SHAFT
Y PULLEY (LOWER) ASSEMBLY
SCREW (A) (CAP 4X6)

**Fig. 9-6-3. Y Pulley (Lower) Assembly Fixing Release**

4. Belt holder bracket disassembly (See Fig.9-6-4.)
   ① Confirm that counter weight assembly is held surely.
   ② Remove two screws (B), and separate the elevator bracket assembly from the belt holder bracket while holding the elevator bracket assembly.
   **NOTE:** The elevator bracket assembly is guided by the linear way.
   If the elevator bracket assembly is not held, it falls down with high speed and it is feared to be broken after separating.
   ③ Put the elevator bracket assembly down with care to the lower stopper while holding the elevator bracket assembly.

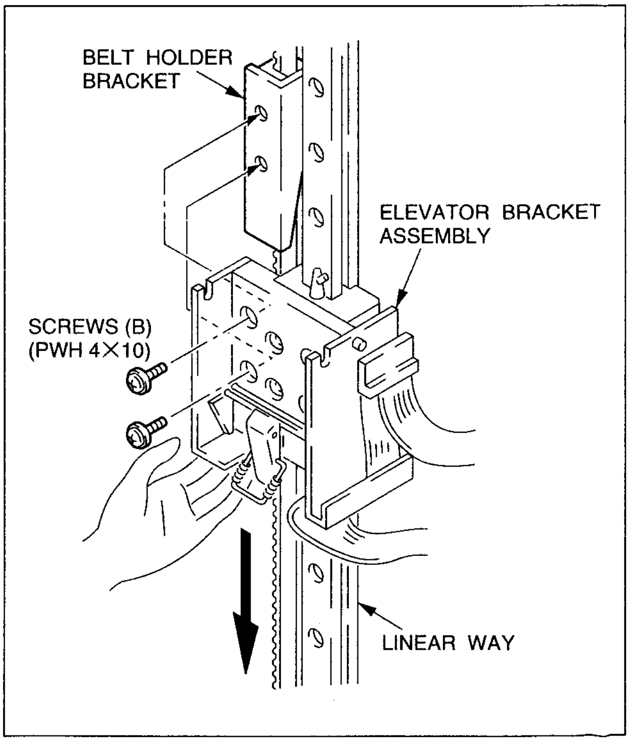

BELT HOLDER BRACKET
ELEVATOR BRACKET ASSEMBLY
SCREWS (B) (PWH 4X10)
LINEAR WAY

**Fig. 9-6-4. Belt Holder Bracket Disassembly**

8. Belt holder bracket installation (See Fig.9-6-9.)
   ① Lift the elevator bracket assembly to the belt holder bracket with care while holding the elevator bracket assembly.
   ② Align the positions of the elevator bracket assembly with the belt holder bracket, and fix them with two screws (B).
   Tightening torque : 1.4 N·m {14 kgf·cm}

9. Install the elevator assembly. (See section 9-2.)

10. Release the CW holding. (See section 9-1-2.)

11. Timing belt (L) tension adjustment. (See Fig.9-6-10.)
   ① By tightening the adjustment screw clockwise, adjust the belt adjustment plate (surface: B) in the standard groove (: A) of the belt (L) adjustment shaft or adjust the end of the adjuster screw at the location shown in the figure.
   ② Tighten two screws (A), and fix the Y pulley (lower) assembly.
   Hexagon L wrench driver d: 3 mm.
   Tightening torque : 1.4 N·m {14 kgf·cm}

12. Turn ON the main power.

13. Operation check
   Execute the automatic test mode of the test mode. (See the test mode in section 5.)
   **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

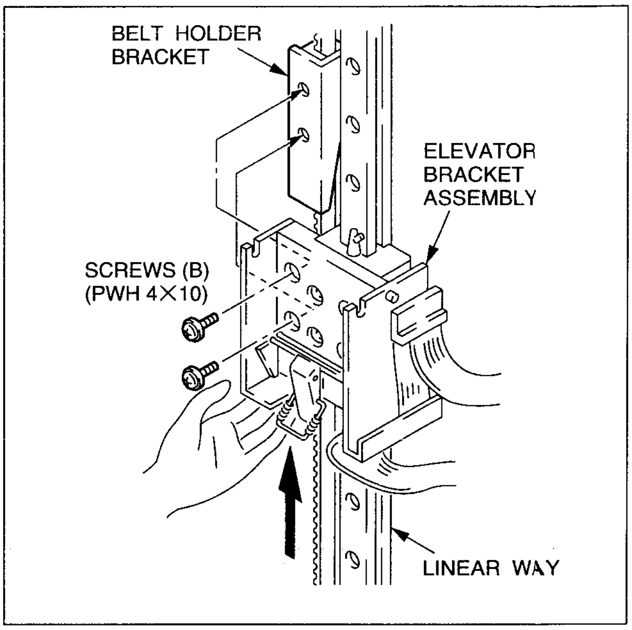
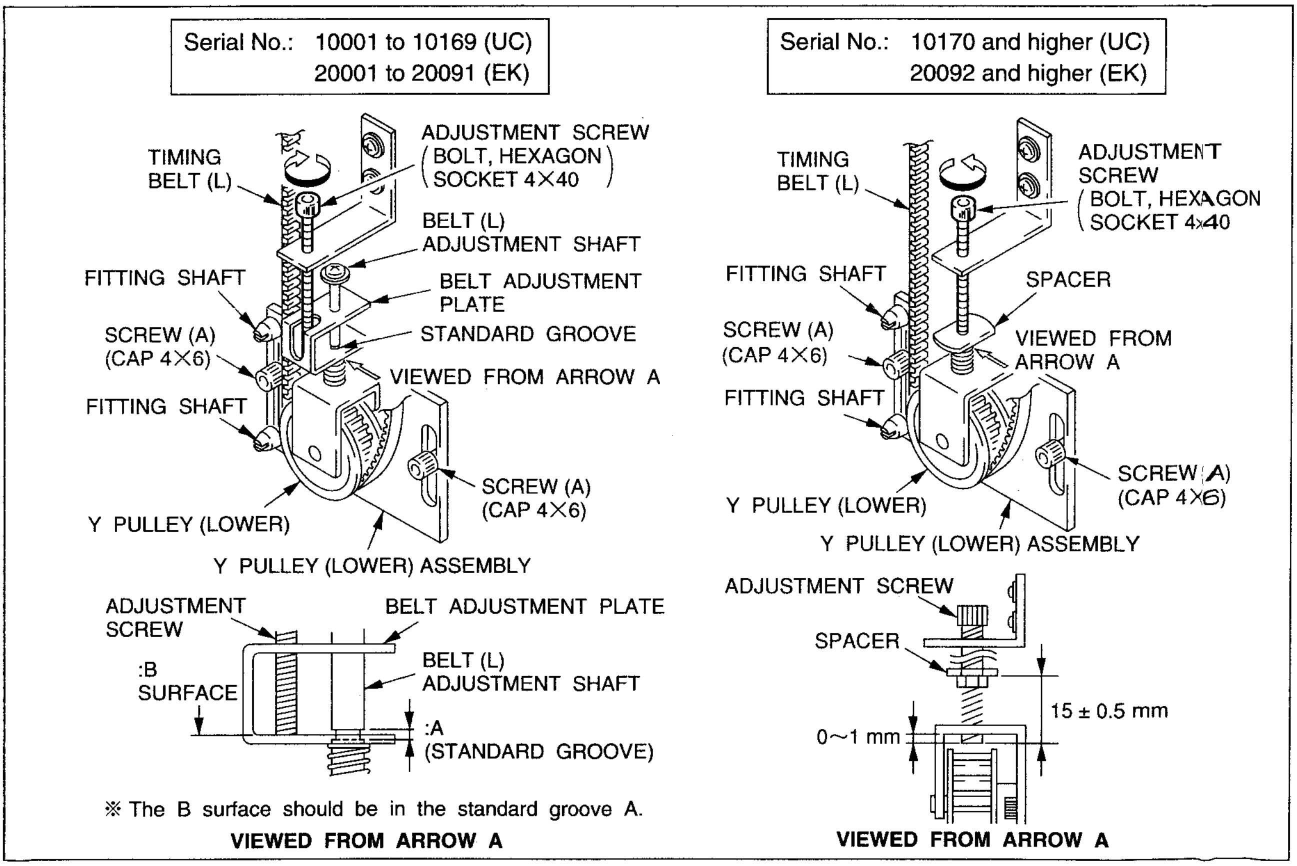

BELT HOLDER BRACKET
ELEVATOR BRACKET ASSEMBLY
SCREWS (B) (PWH 4X10)
LINEAR WAY

Fig. 9-6-9. Belt Holder Bracket Installation


Serial No.: 10001 to 10169 (UC) 20001 to 20091 (EK)

Serial No.: 10170 and higher (UC) 20092 and higher (EK)

TIMING BELT (L)
ADJUSTMENT SCREW (BOLT, HEXAGON SOCKET 4X40)
BELT (L) ADJUSTMENT SHAFT
FITTING SHAFT
BELT ADJUSTMENT PLATE
SCREW (A) (CAP 4X6)
STANDARD GROOVE
VIEWED FROM ARROW A
FITTING SHAFT
SCREW (A) (CAP 4X6)
Y PULLEY (LOWER)
Y PULLEY (LOWER) ASSEMBLY
ADJUSTMENT SCREW
BELT ADJUSTMENT PLATE
:B SURFACE
BELT (L) ADJUSTMENT SHAFT
:A (STANDARD GROOVE)
TIMING BELT (L)
ADJUSTMENT SCREW (BOLT, HEXAGON SOCKET 4X40)
FITTING SHAFT
SPACER
SCREW (A) (CAP 4X6)
VIEWED FROM ARROW A
FITTING SHAFT
SCREW (A) (CAP 4X6)
Y PULLEY (LOWER)
Y PULLEY (LOWER) ASSEMBLY
ADJUSTMENT SCREW
SPACER
15 ± 0.5 mm
0~1 mm

※ The B surface should be in the standard groove A.

**VIEWED FROM ARROW A**

**VIEWED FROM ARROW A**

Fig. 9-6-10. Y Pulley (Lower) Assembly Fixing

## 9-6-2. Counter Weight Assembly / Counter Weight Rail Replacement

### Preliminary Information

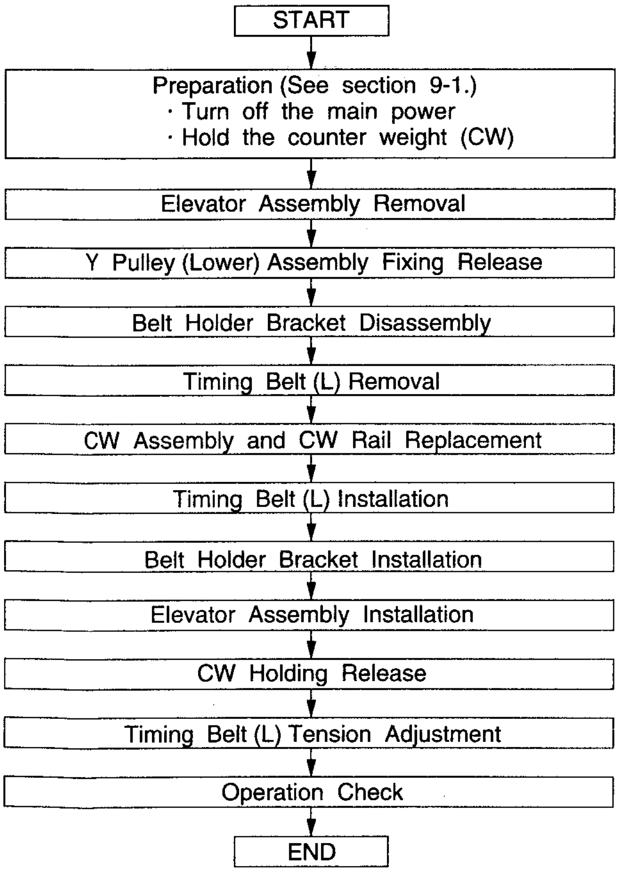
A. Counter weight assembly replacement is performed by a assembly unit.

B. Counter weight assembly replacement is performed by removing the counter weight rail from the console.

C. Read the general information for part replacement in section 9-1. before replacing the counter weight assembly and counter weight rail.

D. Prepare the following tools for replacement.
- Phillips screwdriver No. 2 (for M3 to M5)
- Hexagon L wrench driver d: 2.5 mm

E. The replacement flowchart is shown below.


START
Preparation (See section 9-1.)
· Turn off the main power
· Hold the counter weight (CW)
Elevator Assembly Removal
Y Pulley (Lower) Assembly Fixing Release
Belt Holder Bracket Disassembly
Timing Belt (L) Removal
CW Assembly and CW Rail Replacement
Timing Belt (L) Installation
Belt Holder Bracket Installation
Elevator Assembly Installation
CW Holding Release
Timing Belt (L) Tension Adjustment
Operation Check
END

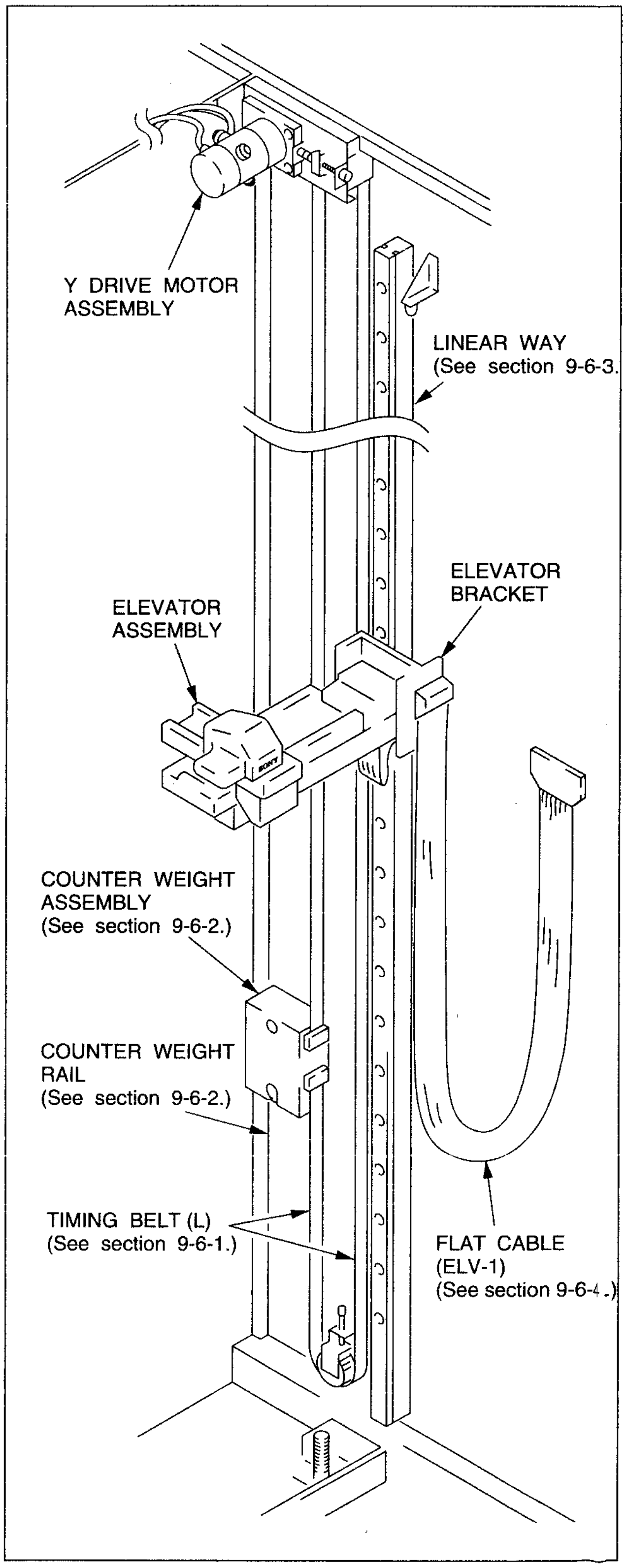

Y DRIVE MOTOR ASSEMBLY
LINEAR WAY (See section 9-6-3.)
ELEVATOR ASSEMBLY
ELEVATOR BRACKET
COUNTER WEIGHT ASSEMBLY (See section 9-6-2.)
COUNTER WEIGHT RAIL (See section 9-6-2.)
TIMING BELT (L) (See section 9-6-1.)
FLAT CABLE (ELV-1) (See section 9-6-4.)

Fig. 9-6-11. CW Assembly / CW Rail Replacement

## Replacement

1. Preparation (See section 9-1.)
   - Turn OFF the main power.
   - Hold the counter weight (CW).

2. Remove the elevator assembly. (See section 9-2.)

3. Release the Y pulley (lower) assembly fixing. (See section 9-6-1.)

4. Disassemble the belt holder bracket. (See section 9-6-1.)

5. Timing belt (L) removal. (See Fig.9-6-12.)
   ① Confirm that CW is held surely.
   ② Remove four screws (A).And remove the belt holder (2) and belt holder (3) from the CW. Then remove the timing belt (L).
   Hexagon L wrench driver d: 2.5 mm.

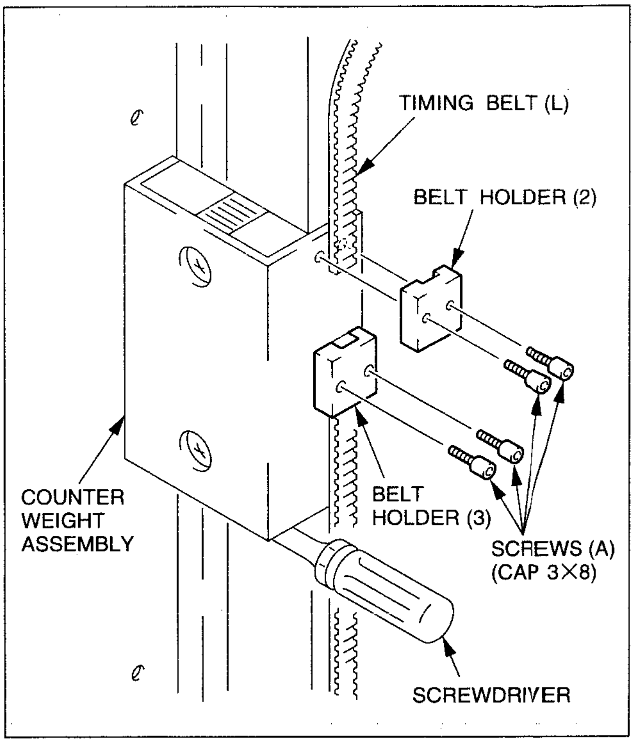

TIMING BELT (L)
BELT HOLDER (2)
COUNTER WEIGHT ASSEMBLY
BELT HOLDER (3)
SCREWS (A) (CAP 3X8)
SCREWDRIVER

Fig. 9-6-12. CW Assembly / CW Rail Removal (1)

6. CW assembly and CW rail removal. (See Fig.9-6-13.)
   ① Remove four screws (B) which are lower the CW rail.
   ② Pull out the screwdriver which holds CW assembly while supporting the CW assembly and put the CW assembly down with care.
   ③ Remove other 14 screws (B) which fixing the CW rail, and remove the CW assembly and CW rail together from the frame.
   **Notes:** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have a total of eight screws (B). Remove two screws in step ① and six in step ③.

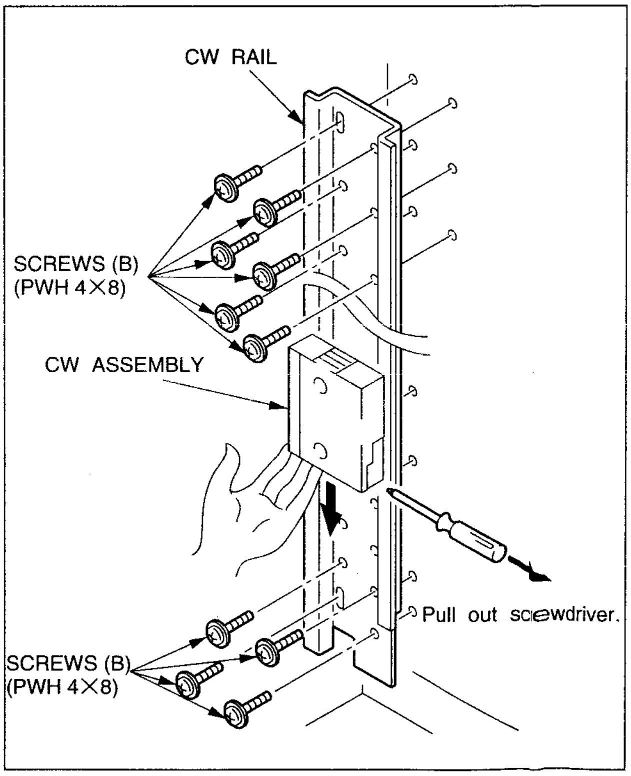

CW RAIL
SCREWS (B) (PWH 4X8)
CW ASSEMBLY
Pull out scewdriver.
SCREWS (B) (PWH 4X8)

Fig. 9-6-13. CW Assembly / CW Rail Removal (2)

7. CW assembly and CW rail replacement. (See Fig. 9-6-14.)
   ① Put the CW rail on the floor (level).Slide the CW assembly in the direction of the arrow, and pull out the CW assembly.
   ② Replace the CW assembly or CW rail with a new one. Insert the CW assembly from the direction of the arrow, and assemble to the CW rail.
   **Notes:** 1. The CW assembly and CW rail have directionality of upper and lower.Exercise caution so as not to wrong the inserting direction.
   2. When replacing the CW assembly or CW rail, clean the each installing surfaces.

8. CW assembly and CW rail installation. (See Fig.9-6-15.)
   ① Push down the CW rail, and install it to the upper/lower longitudinal holes using the two screws (B) but do not tighten.
   ② Tighten other sixteen screws (B) temporarily.
   ③ Thread the sixteen screws (B) from upper (or lower).
   Tightening torque : 1.4 N·m {14 kgf·cm}

9. Install the timing belt (L).
   ① Hold the CW assembly to the position where the timing belt (L) can be installed easily with the screwdriver.
   ② Install the timing belt (L) to the CW assembly. (See section 9-6-1.)

10. Install the belt holder bracket. (See section 9-6-1.)

11. Install the elevator assembly. (See section 9-2.)

12. Release the CW holding. (See section 9-1-2.)

13. Adjust the timing belt (L) tension. (See section 9-6-1.)

14. Turn ON the main power.

15. Operation check
   Execute the automatic test mode of the test mode. (See the test mode in section 5.)
   **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

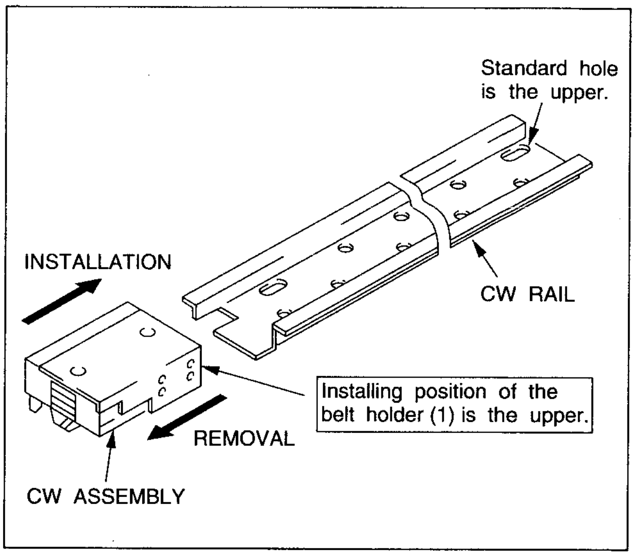

Standard hole is the upper.
INSTALLATION
CW RAIL
Installing position of the belt holder (1) is the upper.
REMOVAL
CW ASSEMBLY

Fig. 9-6-14. CW Assembly / CW Rail Replacement

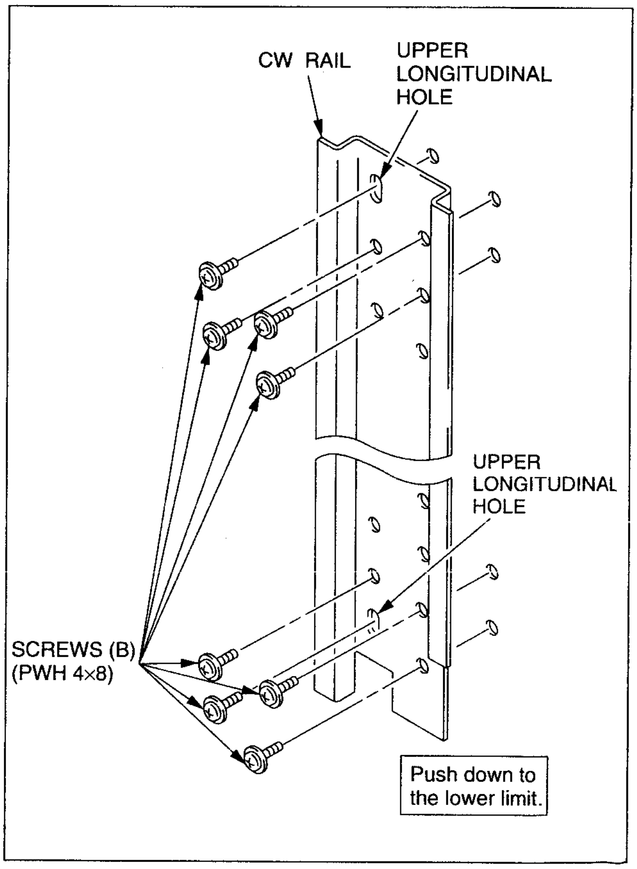

CW RAIL
UPPER LONGITUDINAL HOLE
UPPER LONGITUDINAL HOLE
SCREWS (B) (PWH 4x8)
Push down to the lower limit.

Fig. 9-6-15. CW Assembly / CW Rail Installation

8. Linear way installation (See Fig.9-6-19.)
   ① Fit the side of the linear way to the protrusions which are on the upper and lower the frame.
   **Notes:** 1. The direction of the arrow which is on the linear way (rail) should indicate the protrusions.
   2. When the linear way is handled, exercise caution not to drop the linear slider.
   ② Thread the holes of the upper and lower the linear way with two screws (B) snugly, but do not tighten.
   ③ Thread the every two holes of the linear way with 13 screws (B) snugly, but do not tighten.
   ④ Fit the side of the linear way to the upper and lower protrusions again, and tighten the 15 screws (B) in order from the upper.
   Tightening torque: 3 N·m {30 kgf·cm}

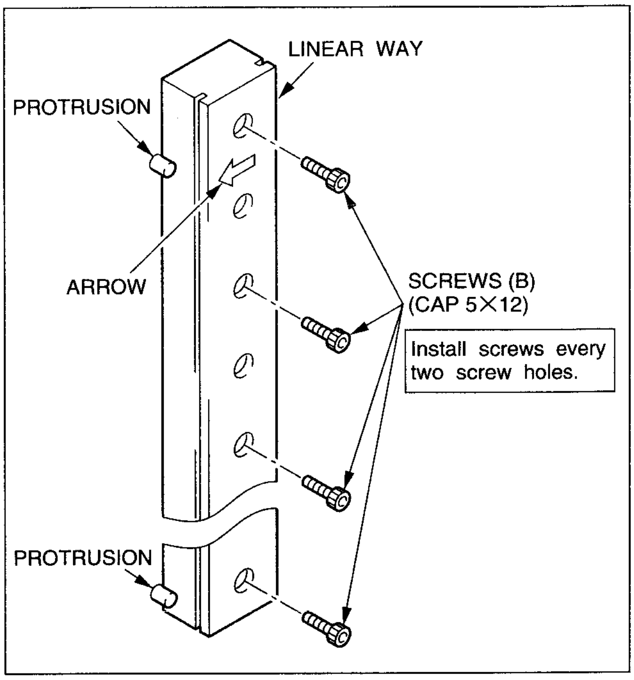

LINEAR WAY
PROTRUSION
ARROW
SCREWS (B)
(CAP 5X12)
Install screws every two screw holes.
PROTRUSION

Fig. 9-6-19. Linear Way Installation

9. Elevator bracket assembly installation (See Fig.9-6-20.)
   ① Lift the linear slider up to the position where the elevator bracket assembly can be installed easily, and hold it.
   ② Align the position of the standard surface A of the elevator bracket assembly with the standard surface B of the linear slider. (See Fig.9-6-20.)
   ③ Insert the screw (A) to the screw hole B of the elevator bracket assembly, and thread snugly but do not tighten. Then, thread other three screws (A) but do not tighten.
   ④ Set the elevator bracket assembly on the linear slider again, and tighten the four screws (A).
   Tightening torque: 3 N·m {30 kgf·cm}

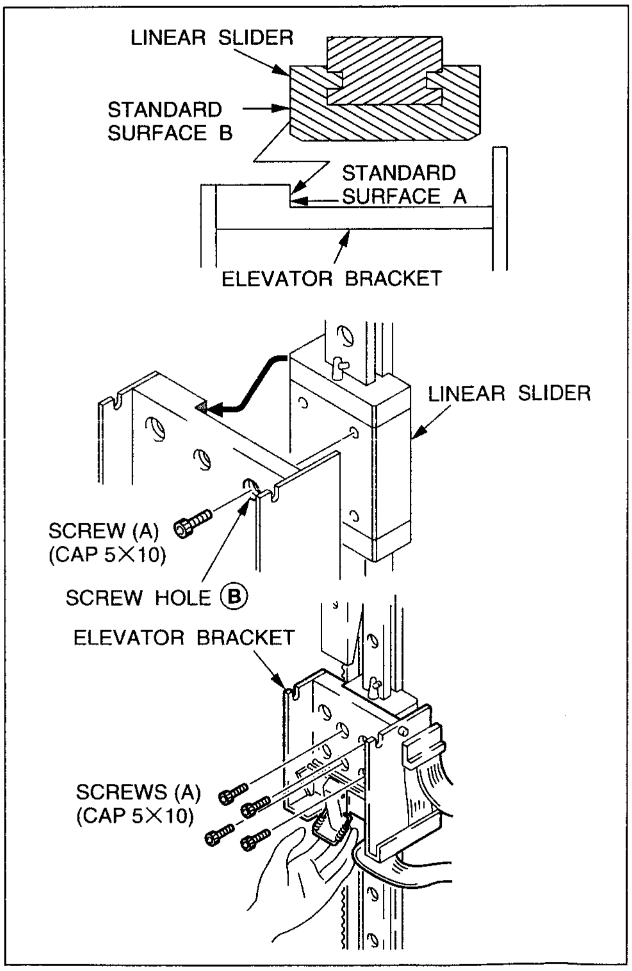

LINEAR SLIDER
STANDARD SURFACE B
STANDARD SURFACE A
ELEVATOR BRACKET
LINEAR SLIDER
SCREW (A)
(CAP 5X10)
SCREW HOLE Ⓑ
ELEVATOR BRACKET
SCREWS (A)
(CAP 5X10)

Fig. 9-6-20. Elevator Bracket Installation

10. Install the belt holder bracket. (See section 9-6-1.)

11. Install the elevator assembly. (See section 9-2.)

12. Release the CW holding. (See section 9-1-2.)

13. Adjust the timing belt (L) tension. (See section 9-6-1.)

14. Perform the elevator parallel check and adjustment. (See section 9-1-4.)

15. Turn ON the main power.

16. Operation check
    Execute the automatic test mode of the test mode. (See the test mode in section 5.)
    **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

### 9-6-4. Flat Cable (ELV-1) Replacement

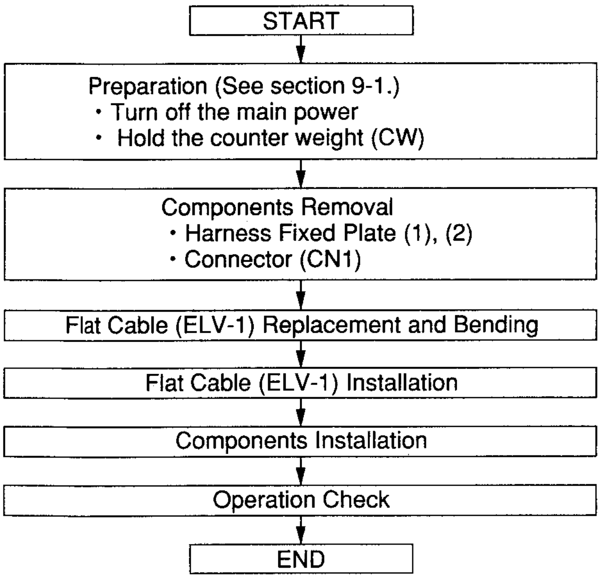
**Preliminary Information**

A. Flat cable (ELV-1) replacement is possible with out removing the elevator assembly from the Y drive block.

B. Read the general information for part replacement in section 9-1. before replacing the flat cable (ELV-1).

C. Prepare the following tools for replacement.
- Phillips screwdriver No. 2 (for M3 to M5)
- Locking compound

D. The replacement flowchart is shown below.


START
Preparation (See section 9-1.)
• Turn off the main power
• Hold the counter weight (CW)
Components Removal
• Harness Fixed Plate (1), (2)
• Connector (CN1)
Flat Cable (ELV-1) Replacement and Bending
Flat Cable (ELV-1) Installation
Components Installation
Operation Check
END

E. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have a cable clamper instead of a harness fixed plate (1), (2). Therefore, the harness fixed plate (1), (2) need not be installed or removed.

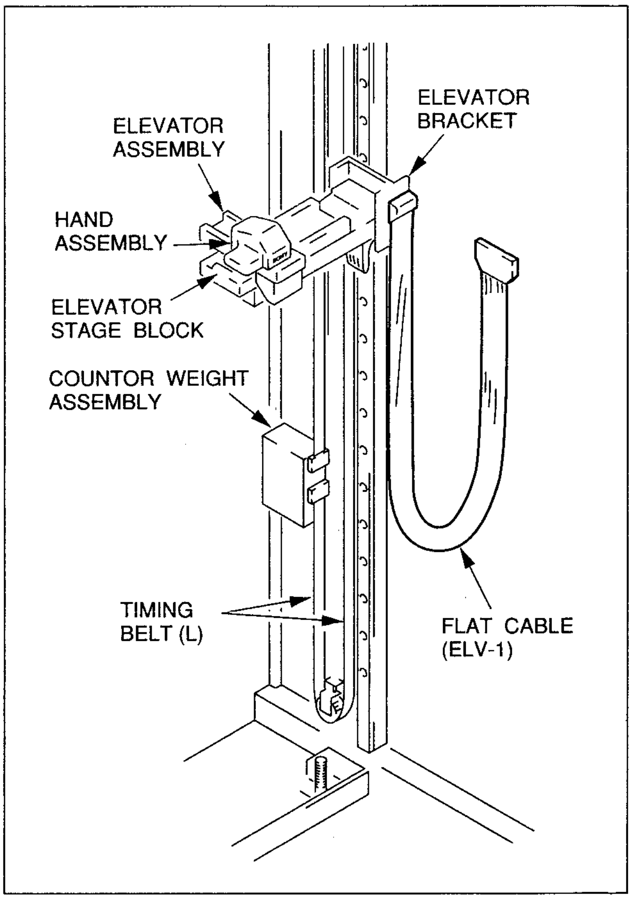

ELEVATOR ASSEMBLY
ELEVATOR BRACKET
HAND ASSEMBLY
ELEVATOR STAGE BLOCK
COUNTOR WEIGHT ASSEMBLY
TIMING BELT (L)
FLAT CABLE (ELV-1)

Fig. 9-6-21. Flat Cable (ELV-1) Replacement

**Replacement**

1. Preparation (See section 9-1.)
   - Turn OFF the main power.

2. Disconnect connector (CN1) (See Fig.9-6-22.)
   Disconnect connector (CN1) from to the CB-47 board.

3. Remove the harness fixed plate (1), (2) (See Fig.9-6-22.)
   Remove four screws (A), and remove the harness fixed plate (1), (2). Or open the two cable clampers.

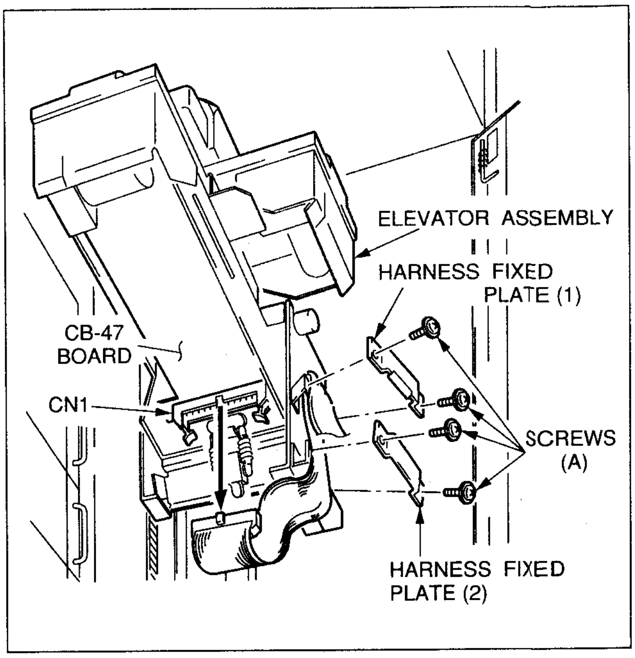

ELEVATOR ASSEMBLY
HARNESS FIXED PLATE (1)
CB-47 BOARD
CN1
SCREWS (A)
HARNESS FIXED PLATE (2)

Fig. 9-6-22. Component Removal (1)

4. Disconnect connector (See Fig.9-6-23.)
   Disconnect connector from the frame side.

5. Replace the flat cable (ELV-1).

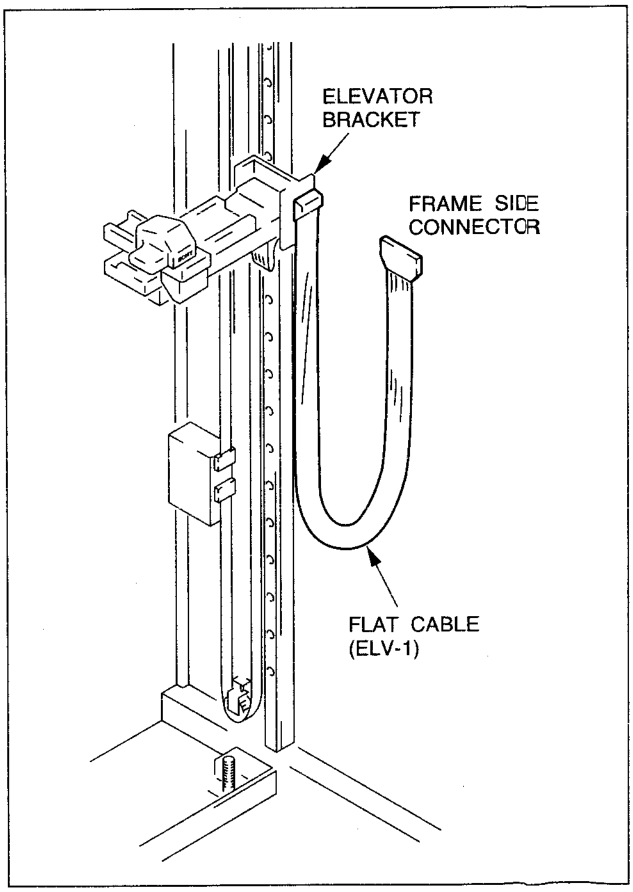

ELEVATOR BRACKET
FRAME SIDE CONNECTOR
FLAT CABLE (ELV-1)

Fig. 9-6-23. Component Removal (2)

6. Bend the flat cable (ELV-1). (See Fig.9-6-24.)
   ① Bend the new flat cable (ELV-1) as shown in the figure.

   **(Reference)**

   | |
   |---|
   | Bend the new flat cable in the dimension and degree as shown in the figure with referring the removed flat cable (ELV-1). |

   ② The flat cable has directionality, so exercise caution in the direction (monotone side and some colors side or UL approval marking side and monotone side) of bending.

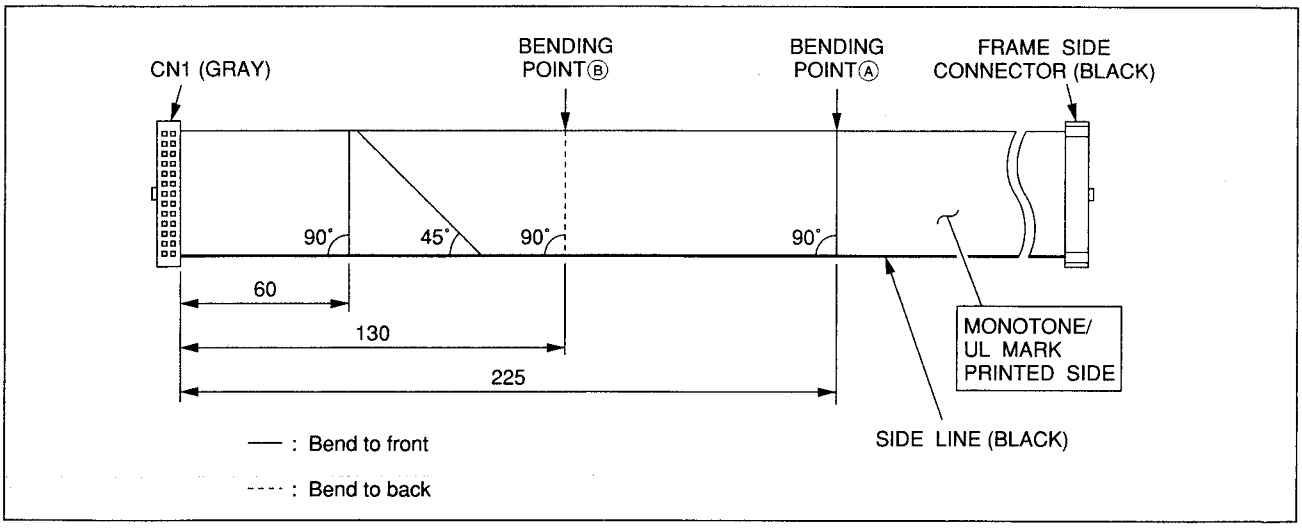

CN1 (GRAY)
BENDING POINTⒷ
BENDING POINTⒶ
FRAME SIDE CONNECTOR (BLACK)
90°
45°
90°
90°
60
130
225
MONOTONE/ UL MARK PRINTED SIDE
SIDE LINE (BLACK)
—— : Bend to front
---- : Bend to back

**Fig. 9-6-24. Flat Cable (ELV-1) Bending**

7. Install the harness fixed plate (1), (2) (See Fig. 9-6-25.).
   ① Set the position of the harness fixed plate (1) or cable clamper to the bent flat cable (ELV-1) shown in the figure.

   **Note:** The flat cable (ELV-1) has directionality. Affix the flat cable (ELV-1) so that monotone (blue) /UL approval marking side will look outside.

   ② Install the harness fixed plate (1), (2) with the two screws (a).

   Otherwise, close the two cable clampers.

   **Note:** When closing the lower cable clamper, be careful not to catch the flat cable in it.

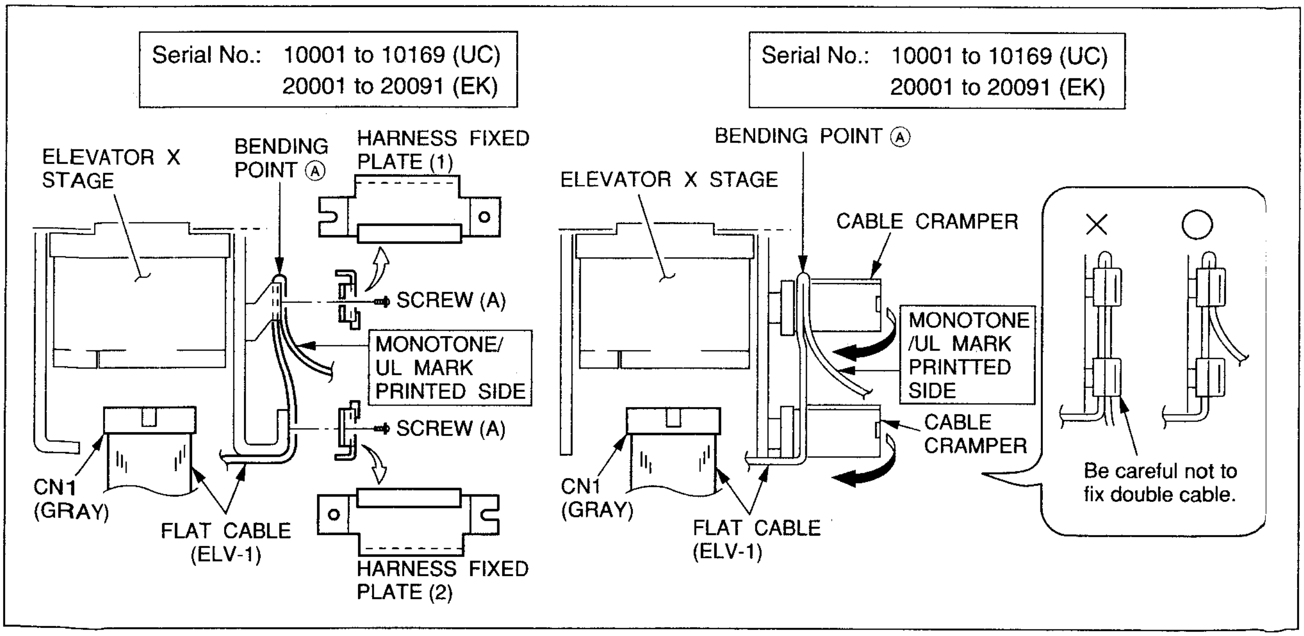

Serial No.: 10001 to 10169 (UC)
20001 to 20091 (EK)
ELEVATOR X STAGE
BENDING POINT Ⓐ
HARNESS FIXED PLATE (1)
SCREW (A)
MONOTONE/ UL MARK PRINTED SIDE
SCREW (A)
CN1 (GRAY)
FLAT CABLE (ELV-1)
HARNESS FIXED PLATE (2)
Serial No.: 10001 to 10169 (UC)
20001 to 20091 (EK)
BENDING POINT Ⓐ
ELEVATOR X STAGE
CABLE CRAMPER
MONOTONE /UL MARK PRINTTED SIDE
CABLE CRAMPER
CN1 (GRAY)
FLAT CABLE (ELV-1)
×
○
Be careful not to fix double cable.

**Fig. 9-6-25. Harness Fixed Plate Installation**

8. Connect connectors (See Fig.9-6-26.)
   ① Connect connector (CN1) to the CB-47 board.
   ② Connect connector to the frame side.

9. Turn ON the main power.

10. Operation check
    Execute the automatic test mode of the test mode. (See the test mode in section 5.)
    **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

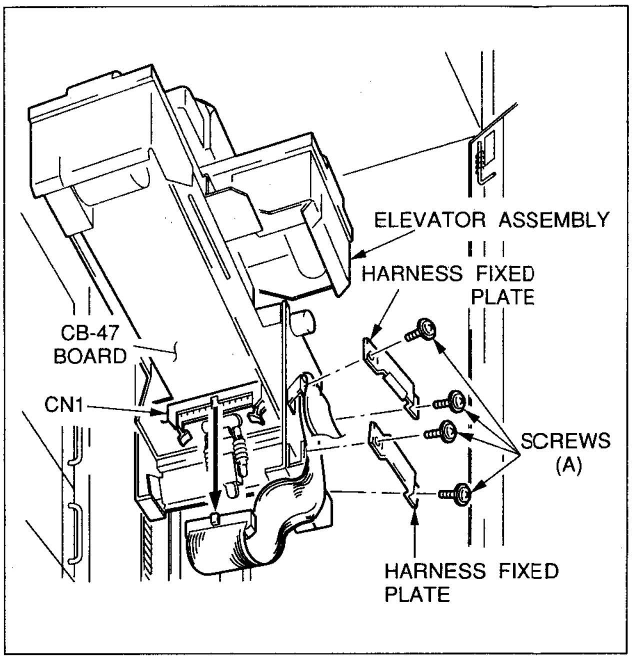

ELEVATOR ASSEMBLY
HARNESS FIXED PLATE
CB-47 BOARD
CN1
SCREWS (A)
HARNESS FIXED PLATE

Fig. 9-6-26. Harness Guide Assembly

## 9-7. Y Drive Motor Assembly Component Replacement

### Preliminary Information

A. The Y drive motor assembly is the part except the Y drive block and the elevator assembly from the elevator block.
(See Fig. 9-7-1.)
[Y drive motor assembly component]
- Y drive motor
- Timing belt (S)
- Midway pulley assembly
- Motor brush

B. Y drive motor's force of the Y drive motor assembly is transfered through the timing belt (S) and the midway pulley assembly, and finally to the Y drive block.

C. Read the general information for part replacement in section 9-1. before replacing the Y drive motor assembly.

D. The replacement procedure of the Y drive motor assembly components are described below.
9-7-1. Y Drive Motor/Motor Pulley Replacement
9-7-2. Motor Brush Replacement
9-7-3. Timing Belt (S)/Midway Pulley Assembly Replacement

E. Prepare the following tools for replacement.
- Hexagon wrench screwdriver d: 2.5 and 3.0 mm
- Phillips screwdriver No. 2 (for M3 to M5)
- Screwdriver

F. Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have some parts whose shapes differ. If parts must be replaced using a different procedure because of the difference in shape, the correct procedure is explained. If no particular replacement procedure is given, use the procedure for other serial numbers.

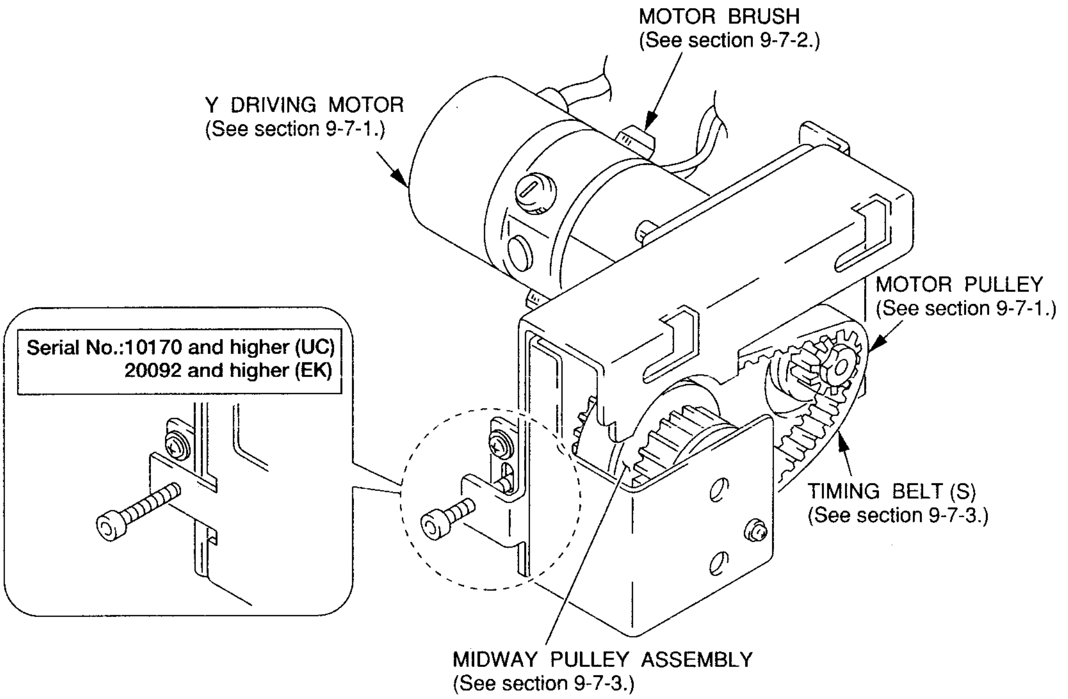

MOTOR BRUSH
(See section 9-7-2.)
Y DRIVING MOTOR
(See section 9-7-1.)
MOTOR PULLEY
(See section 9-7-1.)
Serial No.:10170 and higher (UC)
20092 and higher (EK)
TIMING BELT (S)
(See section 9-7-3.)
MIDWAY PULLEY ASSEMBLY
(See section 9-7-3.)

Fig. 9-7-1. Y Drive Motor Assembly Component

### 9-7-1. Y Drive Motor/Motor Pulley Replacement

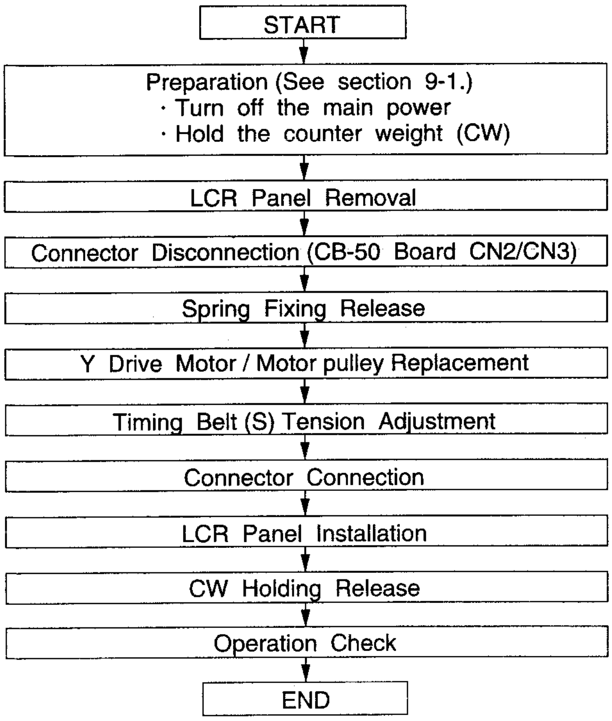
**Preliminary Information**

A. The Y drive motor moves the elevator assembly vertically (Y direction).

B. Read the general information for part replacement in section 9-1. before replacing the Y drive motor.

C. Prepare the following tools for replacement.
- Hexagon wrench driver d: 2.0 mm, 3.0 mm
- Locking compound

D. The replacement flowchart is shown below.


START
Preparation (See section 9-1.)
· Turn off the main power
· Hold the counter weight (CW)
LCR Panel Removal
Connector Disconnection (CB-50 Board CN2/CN3)
Spring Fixing Release
Y Drive Motor / Motor pulley Replacement
Timing Belt (S) Tension Adjustment
Connector Connection
LCR Panel Installation
CW Holding Release
Operation Check
END

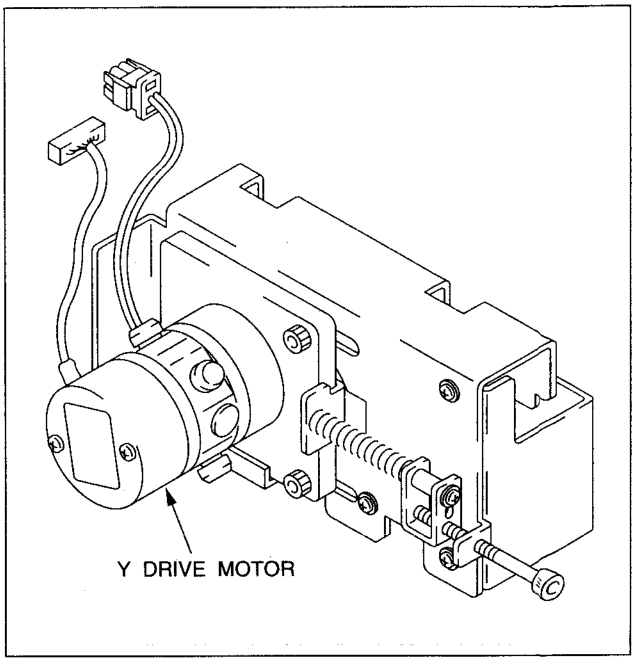

Y DRIVE MOTOR

**Fig. 9-7-2. Y Drive Motor Replacement**

**Replacement**

1. Preparation (See section 9-1.)
   - Turn OFF the main power.
   - Hold the counter weight (CW).

2. Remove the LCR panel. (See Fig. 9-7-3.)
   Remove four screws (B), then remove the LCR panel.
   **Note: 1.** Machines having serial numbers 10169 (for UC) /20091 (for EK) and former have an LCR panel with a different shape, indicated by the botted lines in the figure.
   **2.** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher need not have the LCR panel removed.

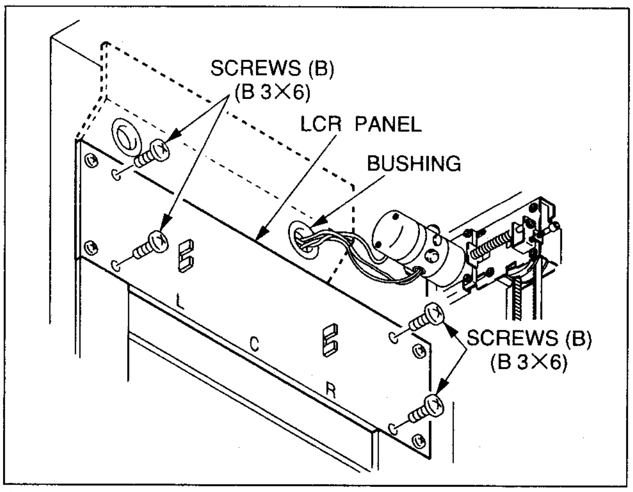

SCREWS (B)
(B 3X6)
LCR PANEL
BUSHING
L
C
R
SCREWS (B)
(B 3X6)

**Fig. 9-7-3. LCR Panel Removal**

3. Disconnect the connectors. (See Fig. 9-7-4.)
   Disconnect two connectors (CN2 and CN3) on the CB-50 board.
   **Note: 1.** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no CB-50 board.
   **2.** Pull out the harness led through the bushing (See Fig.9-7-3) and disconnect the two connectors (CN2 and CN3).

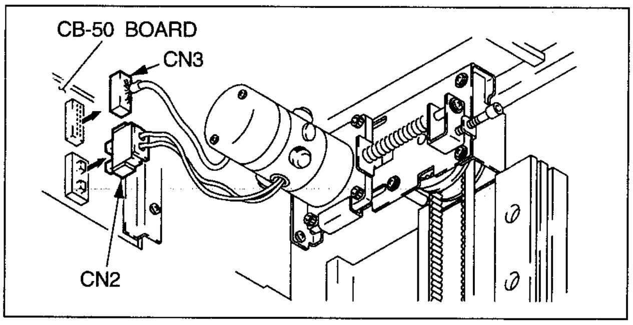

CB-50 BOARD
CN3
CN2

**Fig. 9-7-4. Connector Disconnection**

4. Release the spring fixing. (See Fig. 9-7-5.)
   Turn the adjustment screw counterclockwise so that the spring stretches completly.
   - Hexagon wrench driver d: 3 mm

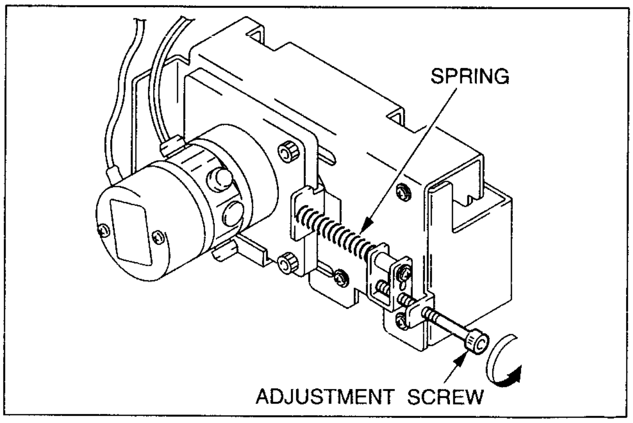

SPRING
ADJUSTMENT SCREW

**Fig. 9-7-5. Spring Fixing Release**

5. Y Drive Motor/Motor Pulley Replacement
   [Y Drive Motor (See Fig. 9-7-6.)]
   ① Remove three screws (A) while holding Y drive motor.
   Hexagon wrench driver d: 3 mm
   ② Pull and remove Y drive motor.

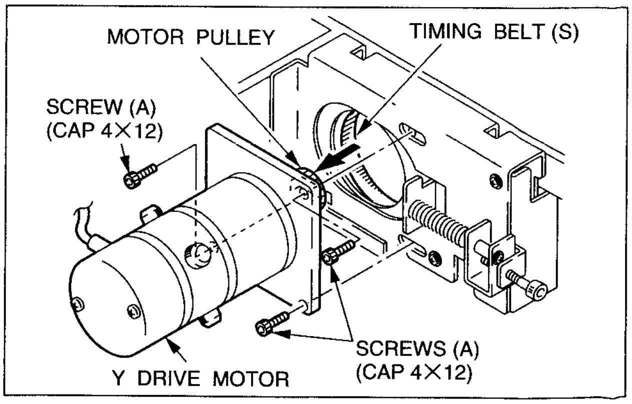

MOTOR PULLEY
TIMING BELT (S)
SCREW (A)
(CAP 4X12)
SCREWS (A)
(CAP 4X12)
Y DRIVE MOTOR

**Fig. 9-7-6. Y Drive Motor Replacement**

③ Install the replaced Y drive motor to the Y pulley (upper) bracket in the direction of the arrow as shown in the figure. When installing the Y drive motor, hang the timing belt (S) on the motor pulley in the Y pulley (upper) bracket surely. (See Fig. 9-7-7.)

④ Align the installing hole of the motor bracket with the screw hole of the motor.

⑤ Tignten three screws (A) temporarily in order (①→②→③).

[Motor Pulley/Key (See Fig.9-7-8)]

(1) Remove the two screws (B), then remove the motor pulley/key.
Use a hexagonal wrench driver with a diameter of 2.0 mm.

(2) Manually fit a new key into the motor pulley and install it.
**NOTE:** Do not strike the key or motor pulley during installation, or parts inside the motor may be damaged.

(3) Apply locking compound slightly to two screws (B). (for screw portion)

(4) Adjust the position of the end of the motor shaft and the end of the pulley and tighten the two screws (B).
Tightening torque: 1.6 N.m (16 kgf. cm)

6. Timing belt (S) tension adjustment
(See Fig. 9-7-9.)
① Turn the adjustment screw clockwise so that belt adjustment plate (:B surface) is in the standard groove (:A) of the belt (S) adjustment shaft as shown in the figure.
Hexagon wrench driver d: 3.0 mm
② Tignten three screws (A).
Tigtening torque: 1.4 N·m {14 kgf·cm}

7. Connect the connectors. (See Fig. 9-7-9.)
Connect the two connectors (CN2 and CN3) to the CB-50 board.
**Note:** **1.** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no CB-50 board.
**2.** Connect the two connectors (CN2 and CN3) to the harness from the SE-192 board and Controller Block that goes through the bushing (See Fig.9-7-3).

8. Install the LCR panel.
Install the LCR panel in the reverse order to step 2.

9. Release the CW holding.
(See section 9-1-2.)

10. Turn ON the main power.

11. Operation check
Execute the automatic test mode of the test mode. (See the test mode in section 5.)
**Note:** Do not perform check using the test mode operating the controlling and controlled units.

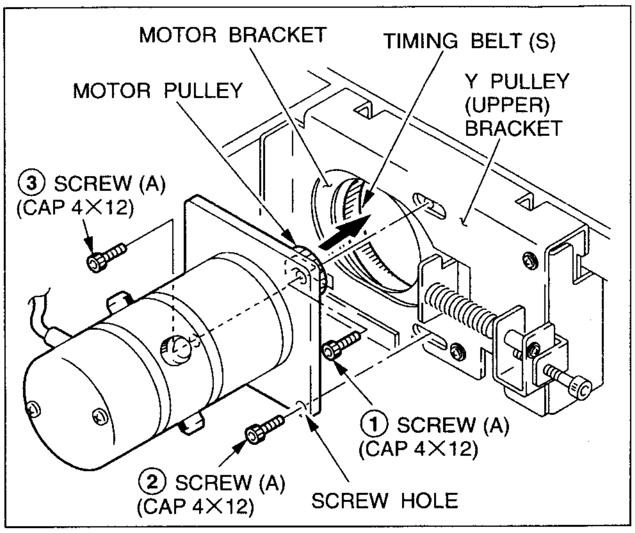

MOTOR BRACKET
TIMING BELT (S)
MOTOR PULLEY
Y PULLEY (UPPER) BRACKET
③ SCREW (A) (CAP 4X12)
① SCREW (A) (CAP 4X12)
② SCREW (A) (CAP 4X12)
SCREW HOLE

**Fig. 9-7-7. Y Drive Motor Replacement**

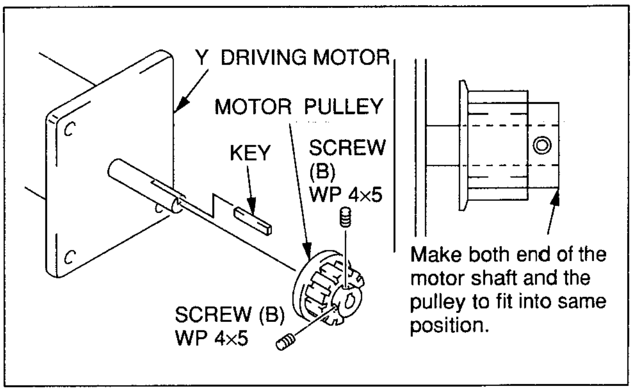
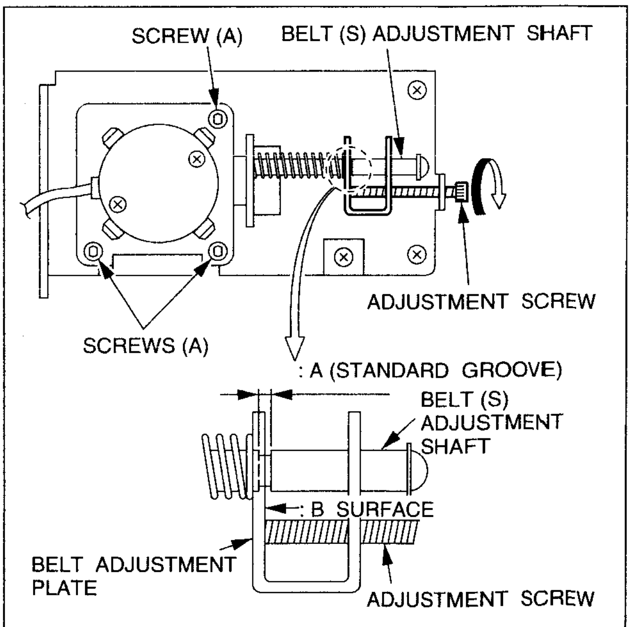

Y DRIVING MOTOR
MOTOR PULLEY
KEY
SCREW (B) WP 4x5
SCREW (B) WP 4x5
Make both end of the motor shaft and the pulley to fit into same position.

**Fig. 9-7-8. Motor Pulley/Key Replacement**


SCREW (A)
BELT (S) ADJUSTMENT SHAFT
ADJUSTMENT SCREW
SCREWS (A)
: A (STANDARD GROOVE)
BELT (S) ADJUSTMENT SHAFT
: B SURFACE
BELT ADJUSTMENT PLATE
ADJUSTMENT SCREW

※ The B surface should be in the standard groove A.

**Fig. 9-7-9. Timing Belt (S) Tension Adjustment**

### 9-7-2. Motor Brush Replacement

**Preliminary Information**

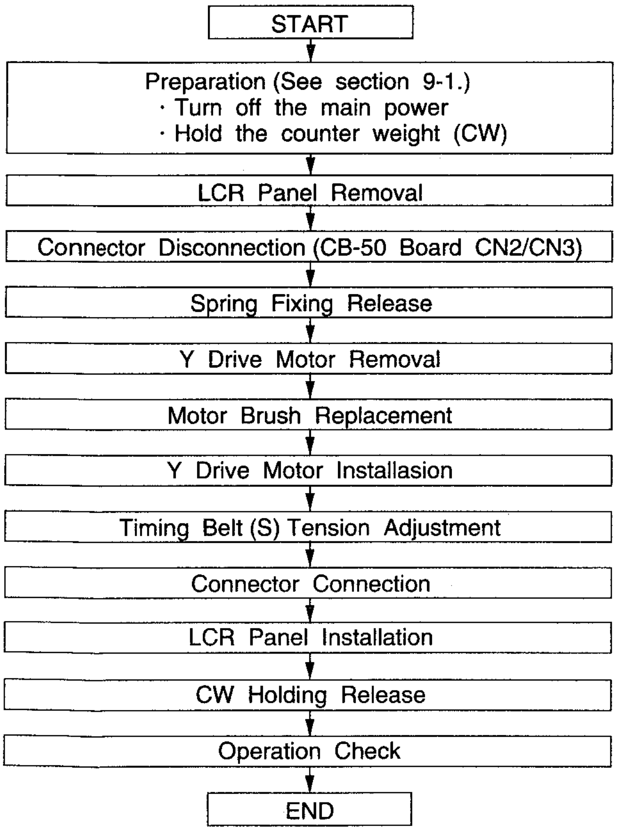
A. This part replacement is performed by removing the Y drive motor from the Y drive motor assembly.

B. Y drive motor has four motor brushes.
Four motor brushes are replaced at the same time.

C. Read the general information for part replacement in section 9-1. before replacing the motor brushes.

D. Prepare the following tools for replacement.
- Hexagon L wrench driver d: 3.0 mm
- Screwdriver

E. The replacement flowchart is shown below.


START
Preparation (See section 9-1.)
· Turn off the main power
· Hold the counter weight (CW)
LCR Panel Removal
Connector Disconnection (CB-50 Board CN2/CN3)
Spring Fixing Release
Y Drive Motor Removal
Motor Brush Replacement
Y Drive Motor Installasion
Timing Belt (S) Tension Adjustment
Connector Connection
LCR Panel Installation
CW Holding Release
Operation Check
END

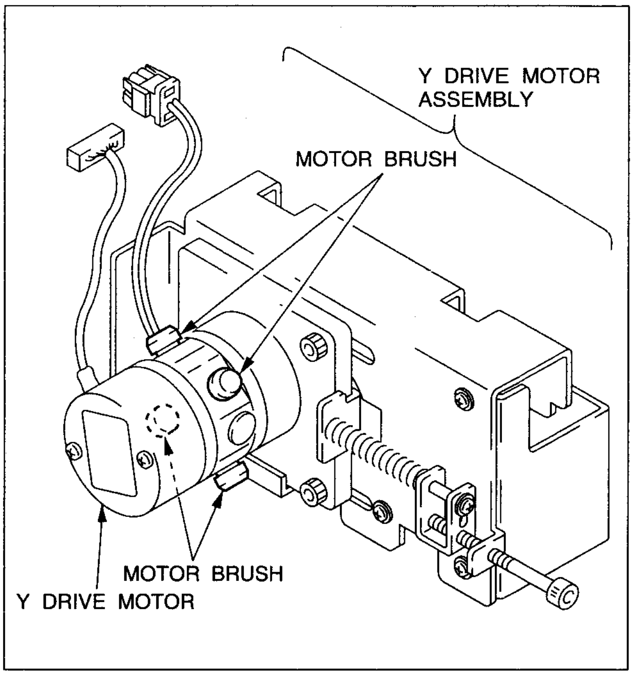

Y DRIVE MOTOR ASSEMBLY
MOTOR BRUSH
MOTOR BRUSH
Y DRIVE MOTOR

**Fig. 9-7-10. Motor Brush Replacement**

**Replacement**

1. Preparation (See section 9-1.)
   - Turn OFF the main power.
   - Hold the counter weight (CW).

2. Remove the LCR panel.
   (See section 9-7-1.)

3. Disconnect the connector. (See Fig.9-7-11.)
   Disconnect two connectors (CN2 and CN3) from the CB-50 board.
   **Note: 1.** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no CB-50 board.
   **2.** Pull out the harness led through the bushing (See Fig.9-7-3) and disconnect the two connectors (CN2 and CN3).

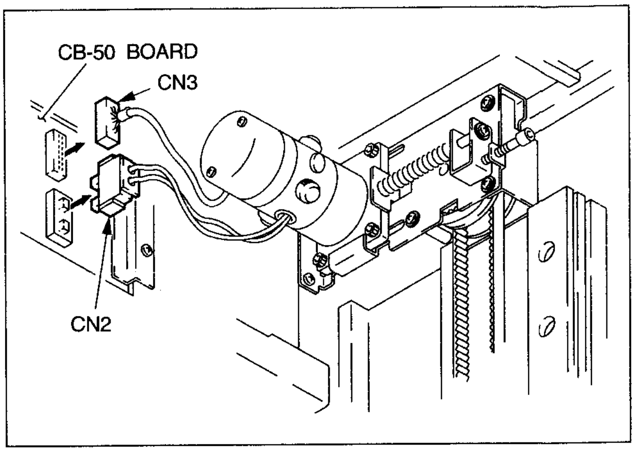

CB-50 BOARD
CN3
CN2

**Fig. 9-7-11. Connector Disconnection**

4. Release the spring fixing. (See Fig.9-7-12.)
   Turn the adjustment screw counterclockwise so that spring stretches completely.
   Hexagon wrench driver d: 3 mm.

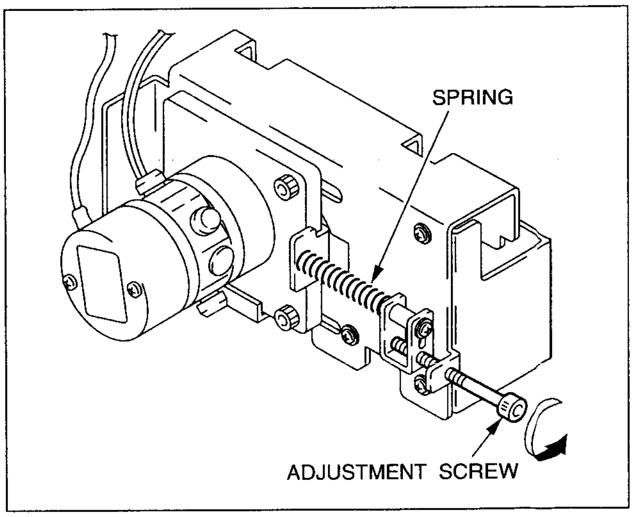

SPRING
ADJUSTMENT SCREW

**Fig. 9-7-12. Spring Fixing Release**

5. Y drive motor removal. (See Fig.9-7-13.)
   ① Remove three screws (A) while holding the Y drive motor.
   Hexagon wrench drriver d: 3 mm.
   ② Pull and remove the Y drive motor.

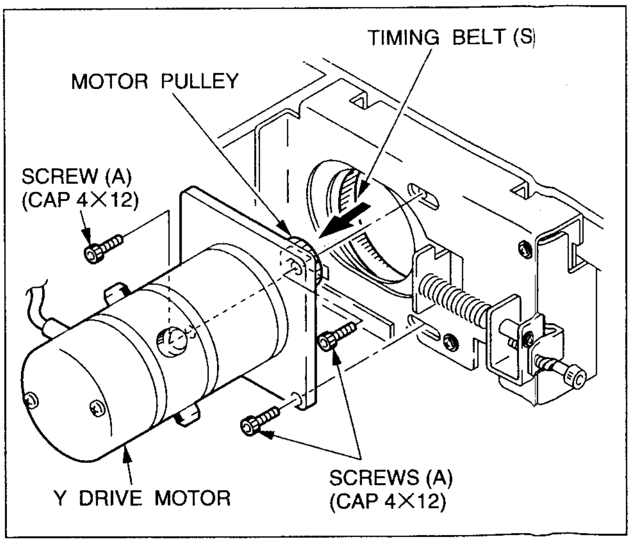

TIMING BELT (S)
MOTOR PULLEY
SCREW (A)
(CAP 4X12)
Y DRIVE MOTOR
SCREWS (A)
(CAP 4X12)

**Fig. 9-7-13. Y Drive Motor Removal**

6. Motor brush replacement (See Fig.9-7-14.)
   The four motor brushes replacement described below should be performed at the same time.
   The four replacements can be performed in the same procedure.
   The replacement procedure for one part is described in this section.
   Replace other three parts in the same procedure.
   ① Turn the brush cap counterclockwise, and remove it.
   ② Set the screwdriver to the terminal of the motor brush to float, and pull out the motor brush manually.
   ③ Replace the motor brush.
   ④ Insert the motor brush to the brush installing hole of the Y drive motor as shown in the figure.
   **Note:** Insert the motor brush so as not to transform the bracket of the motor brush.
   ⑤ Turn the brush cap clockwise and install.
   After installing, confirm that brush cap has no play and looseness.

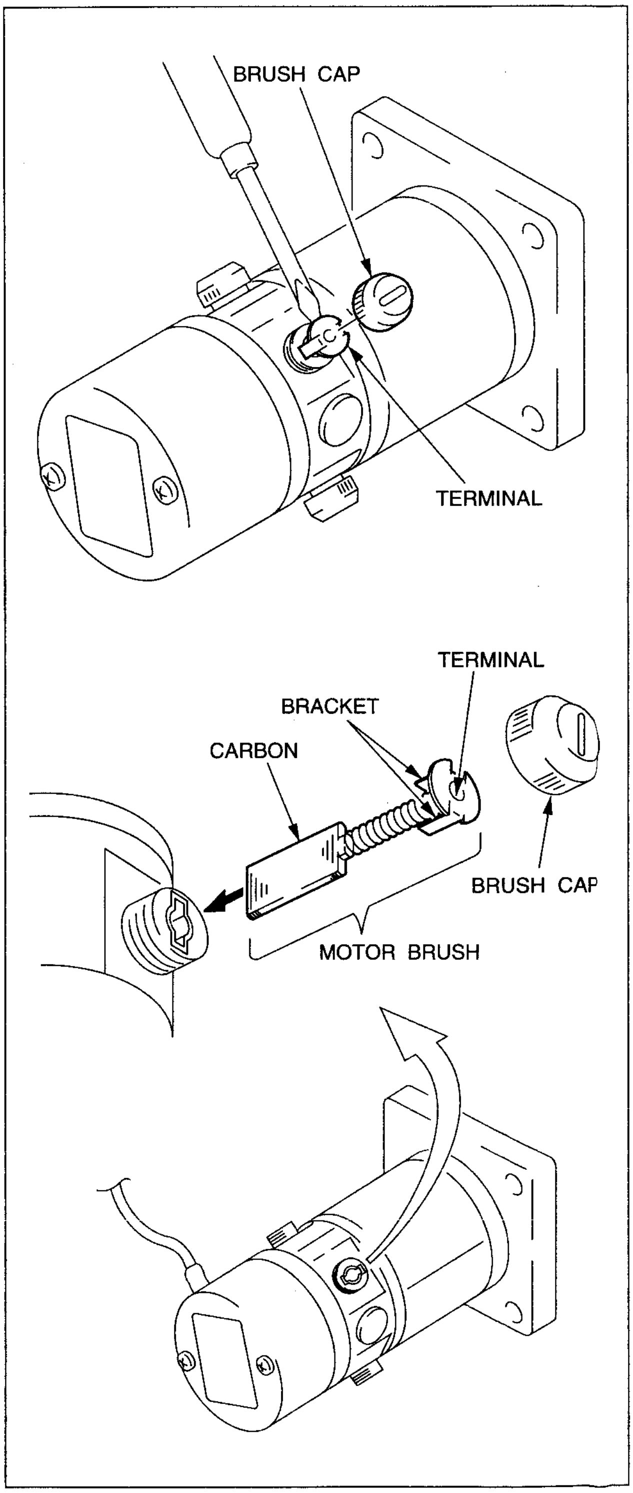


**Fig. 9-7-14. Motor Brush Replacement**

7. Y drive motor installation. (See Fig.9-7-15.)
   ① Install the Y drive motor to the Y pulley (upper) bracket in the direction as shown in the figure. When installing, hang the timing belt (S) in the Y pulley (upper) bracket to the motor pulley surely.
   ② Align the installing hole of the motor bracket with the screw hole of the motor.
   Tighten three screws (A) temporarily in order (① → ② → ③).

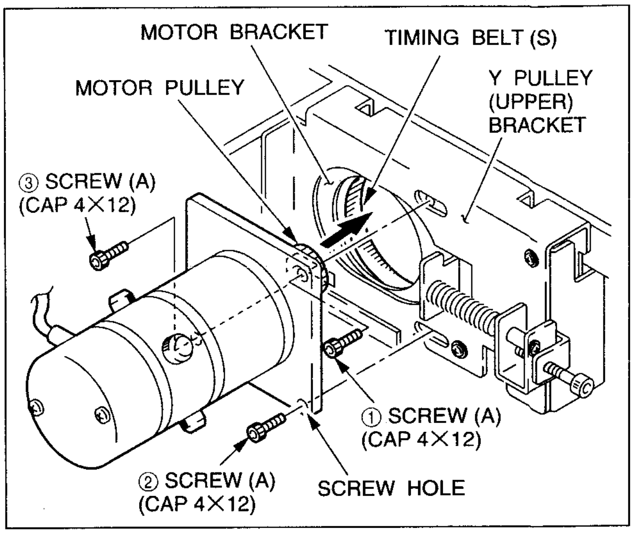
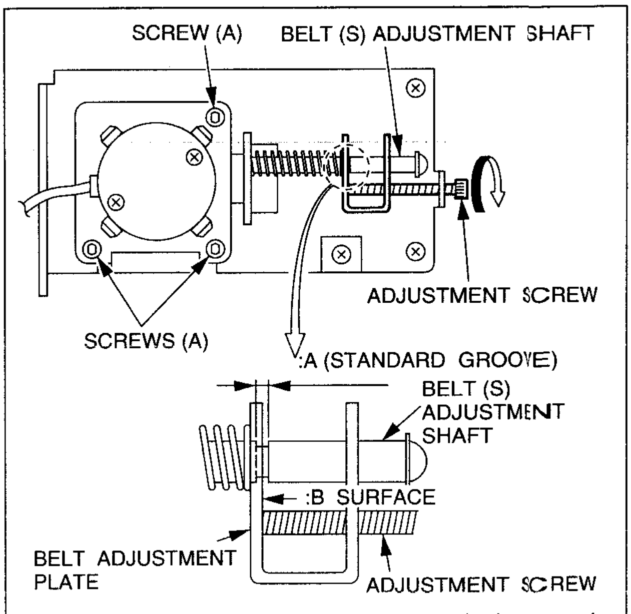

MOTOR BRACKET
TIMING BELT (S)
MOTOR PULLEY
Y PULLEY (UPPER) BRACKET
③ SCREW (A) (CAP 4X12)
① SCREW (A) (CAP 4X12)
② SCREW (A) (CAP 4X12)
SCREW HOLE

**Fig. 9-7-15. Y Drive Motor Installation**

8. Timing belt (S) tension adjustment. (See Fig.9-7-16.)
   ① Turn the adjustment screw clockwise so that belt adjustment plate (:B surface) is in the standard groove (:A) of the belt (S) adjustment shaft as shown in the figure.
   Hexagon wrench driver d: 3 mm.
   ② Tighten three screws (A).
   Tightening torque : 1.4 N·m {14 kgf·cm}


SCREW (A)
BELT (S) ADJUSTMENT SHAFT
ADJUSTMENT SCREW
SCREWS (A)
:A (STANDARD GROOVE)
BELT (S) ADJUSTMENT SHAFT
:B SURFACE
BELT ADJUSTMENT PLATE
ADJUSTMENT SCREW

※ The B surface should be in the standard groove A.

**Fig. 9-7-16. Timing Belt (S) Tension Adjustment**

9. Connect the connectors. (See Fig.9-7-17.)
   Connect two connectors (CN2 and CN3) to the CB-50 board.
   **Note: 1.** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no CB-50 board.
   **2.** Connect the two connectors (CN2 and CN3) to the harness from the SE-192 board and Controller Block that goes through the bushing (See Fig.9-7-3).

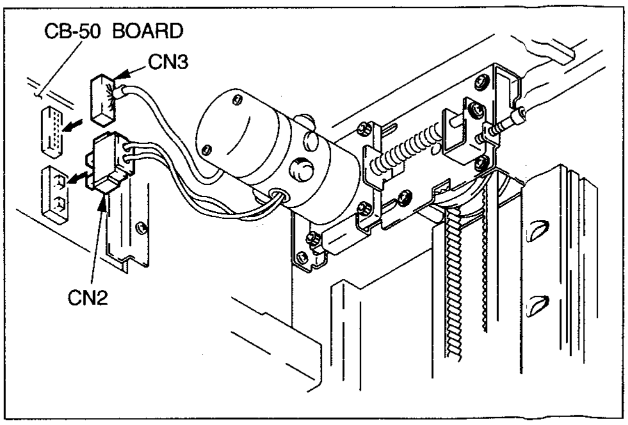

CB-50 BOARD
CN3
CN2

**Fig. 9-7-17. Connector Connection**

10. Install the LCR panel.
    Install the LCR panel in the reverse order to the step 2.

11. Release the CW holding.
    (See section 9-1-2.)

12. Turn ON the main power.

13. Operation check
    Execute the automatic test mode of the test mode.
    (See the test mode in section 5.)
    **Note:** Do not perform check using the test mode when operating the controlling and controlled units.

### 9-7-3. Timing Belt (S) /Midway Pulley Assembly Replacement

#### Preliminary Information

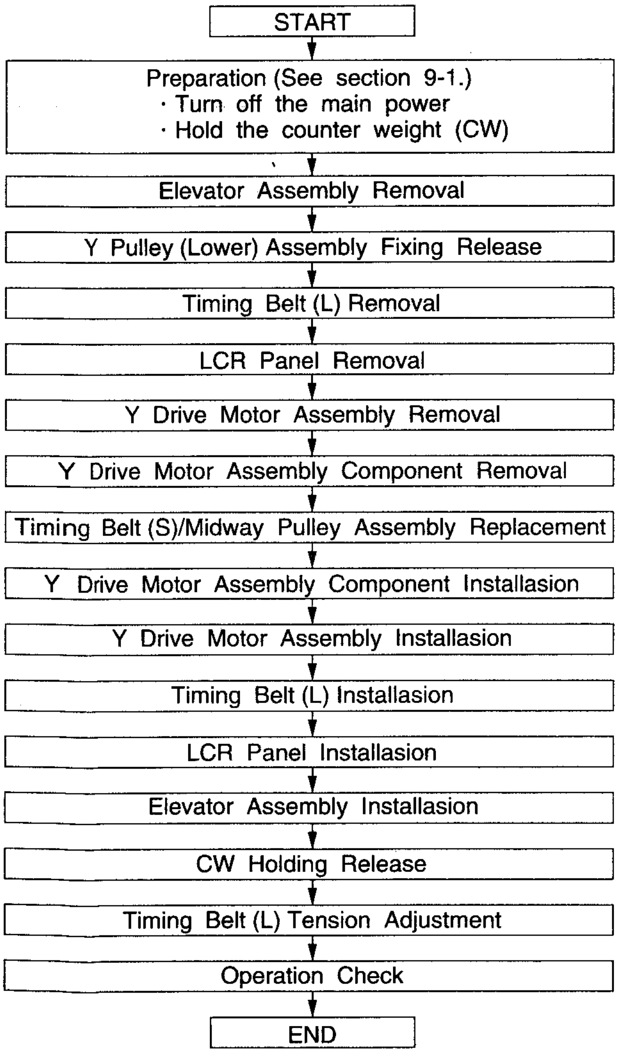
A. The timing belt (S) and the midway pulley assembly are replaced in the same procedure.

B. These parts replacement is performed by removing the Y drive motor assembly from the unit.

C. Read the general information for part replacement in section 9-1. before replacing the timing belt (S) and midway pulley assembly.

D. Prepare the following tools for replacement.
- Phillips screwdriver No.2 (for M3 to M5)
- Hexagon L wrench driver d: 2.5 and 3 mm

E. The replacement flowchart is shown below.


START
Preparation (See section 9-1.)
· Turn off the main power
· Hold the counter weight (CW)
Elevator Assembly Removal
Y Pulley (Lower) Assembly Fixing Release
Timing Belt (L) Removal
LCR Panel Removal
Y Drive Motor Assembly Removal
Y Drive Motor Assembly Component Removal
Timing Belt (S)/Midway Pulley Assembly Replacement
Y Drive Motor Assembly Component Installasion
Y Drive Motor Assembly Installasion
Timing Belt (L) Installasion
LCR Panel Installasion
Elevator Assembly Installasion
CW Holding Release
Timing Belt (L) Tension Adjustment
Operation Check
END

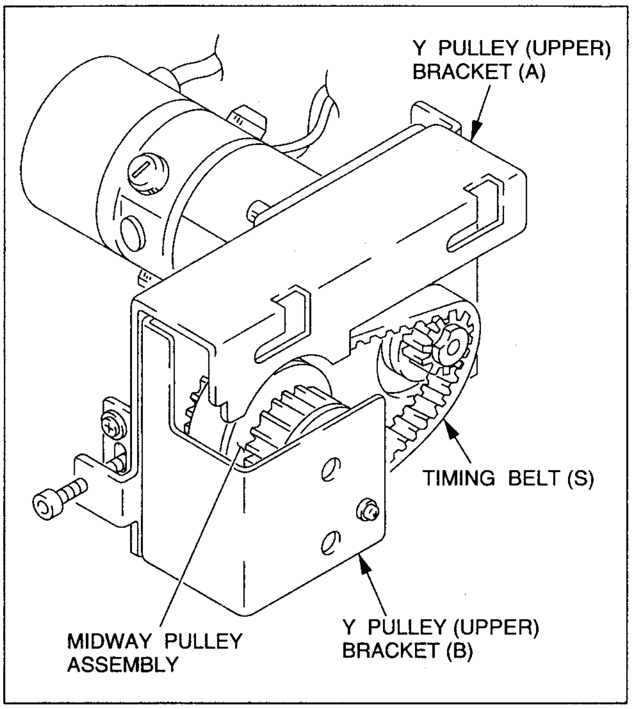

Y PULLEY (UPPER) BRACKET (A)
TIMING BELT (S)
MIDWAY PULLEY ASSEMBLY
Y PULLEY (UPPER) BRACKET (B)

Fig. 9-7-18. Y Drive Motor Assembly

**Replacement**

1. Preparation (See section 9-1.)
   - Turn OFF the main power.
   - Hold the counter weight (CW).

2. Remove the elevator assembly. (See section 9-2.)

3. Release the Y pulley (lower) assembly fixing. (See section 9-6-1.)

4. Timing belt (L) removal (See Fig.9-7-19.)
   ① Confirm that CW is held surely.
   ② Remove two screws (A) which are on the upper position of the CW, then remove the belt holder (2) and the timing belt (L).
   Hexagon L wrench driver d: 2.5 mm
   **Note:** When removing the belt holder (2), hold the top position of the timing belt (L). Support the elevator bracket manually as shown in the figure.
   ③ Release the timing belt (L) holding.
   Put the elevator bracket down to the lower stopper while supporting the elevator bracket.
   ④ The timing belt (L) comes off from the midway pulley by putting the elevator assembly down.

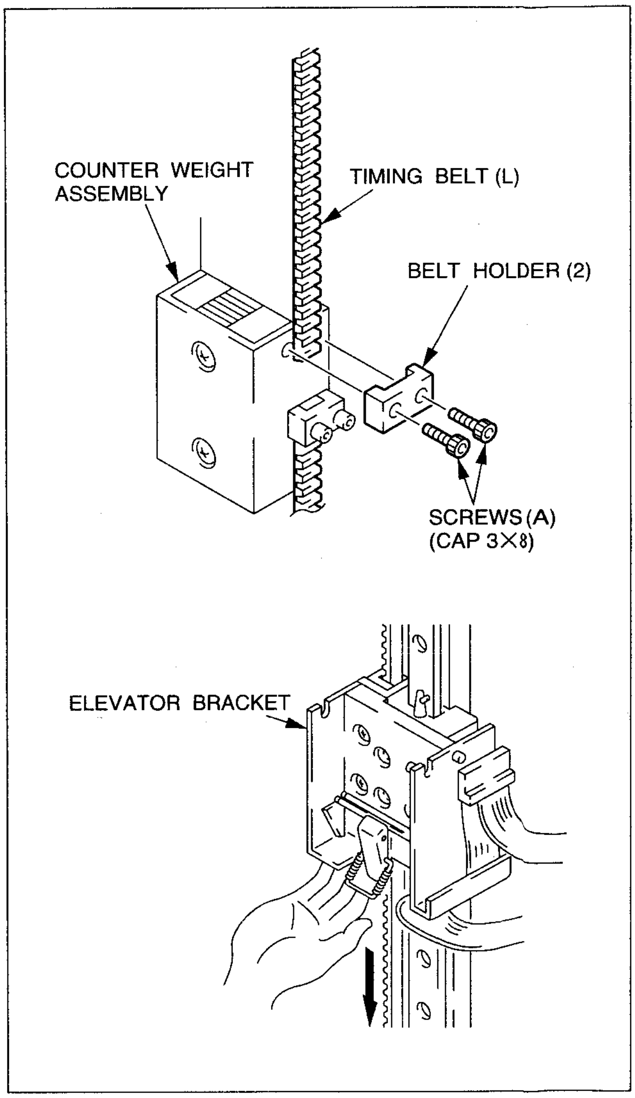


**Fig. 9-7-19. Timing Belt (L) Removal**

5. Remove the LCR panel. (See section 9-7-1.)

6. Y drive motor assembly removal (See Fig.9-7-20.)
   ① Disconnect two connectors CN2 and CN3 from the CB-50 board.
   **Note: 1.** Machines having serial numbers 10170 (for UC) /20092 (for EK) and higher have no CB-50 board.
   **2.** Pull out the harness led through the bushing (See Fig.9-7-3) and disconnect the two connectors (CN2 and CN3).
   ② Remove two screws (B), then remove the Y drive motor assembly by moving in the direction of the arrow shown in the figure.

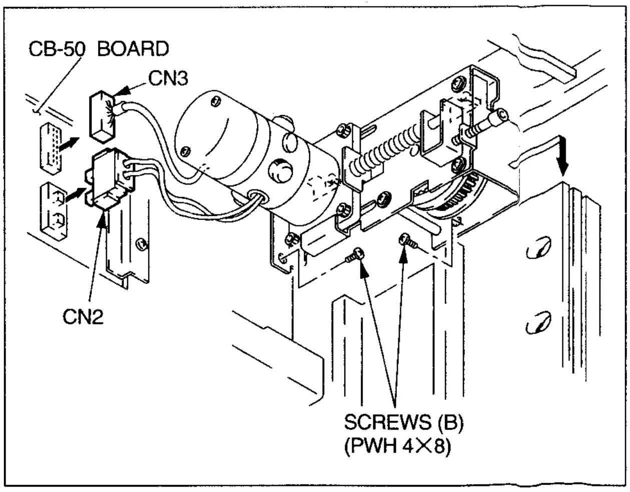


**Fig. 9-7-20. Y Drive Motor Assembly Removal**

7. Y drive motor assembly component removal (See Fig. 9-7-21.)
   ① Turn the adjustment screw counterclockwise so that the spring stretches completely.
   Hexagon L wrench driver d: 3 mm
   ② Remove three screws (C), then remove the Y drive motor. (See Fig-1.)
   Hexagon L wrench driver d: 3 mm
   ③ Remove two screws (D), then remove the Y pulley (upper) bracket (B). (See Fig-2.)
   **Note:** Since machines having serial numbers 10169 (for UC) /20091 (for EK) and former have Y-pulley (upper) bracket (A) and (B) of a different shape, reverse the sequence of steps (3) and (4).
   ④ Pull out the belt adjustment plate from the adjustment screw. (See Fig-3.)
   ⑤ Remove screw (E), then remove the Y pulley (upper) shaft assembly and the timing belt (S). (See Fig- 4.)

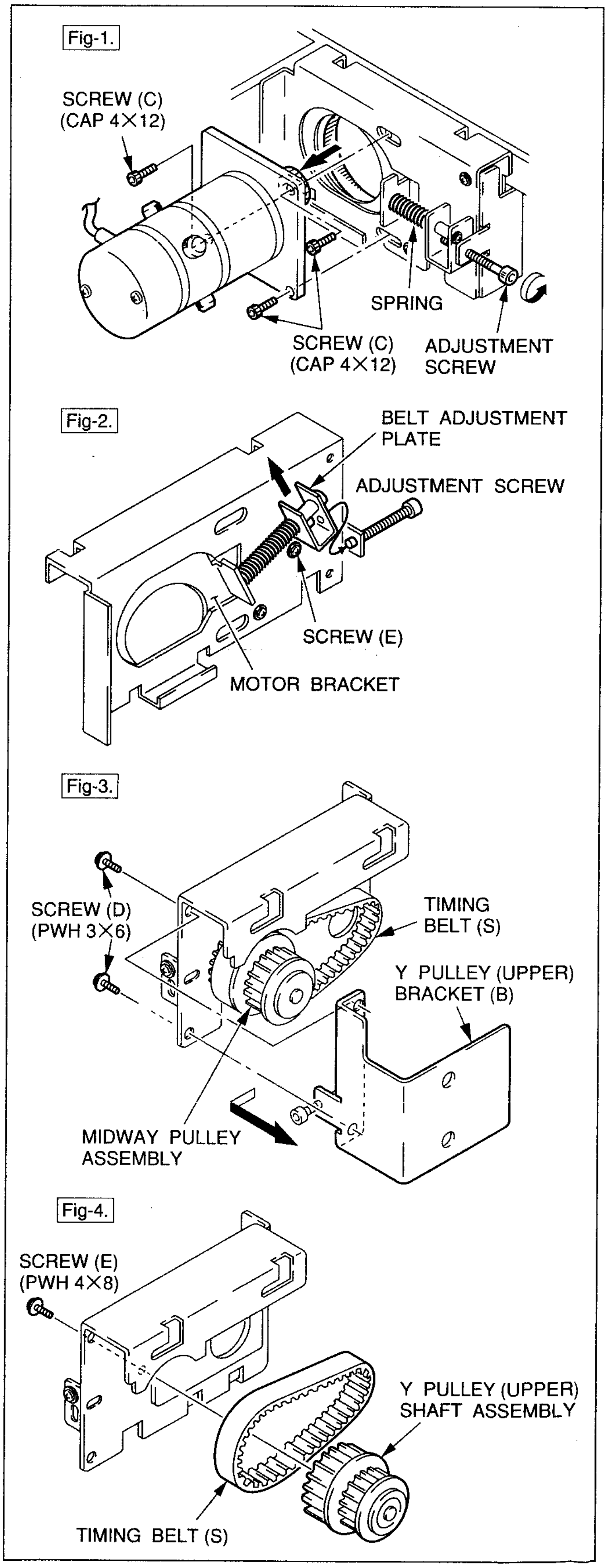
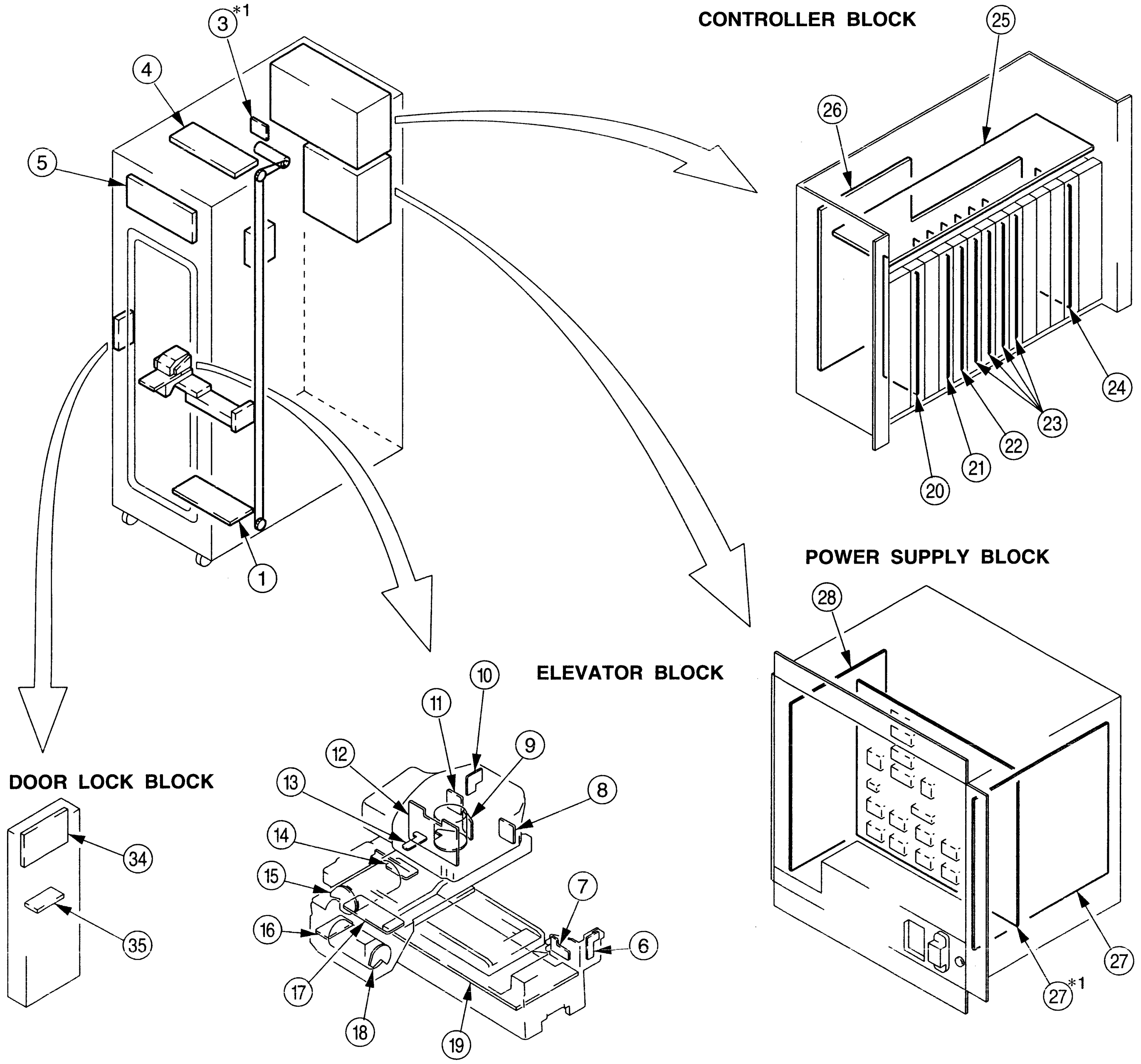
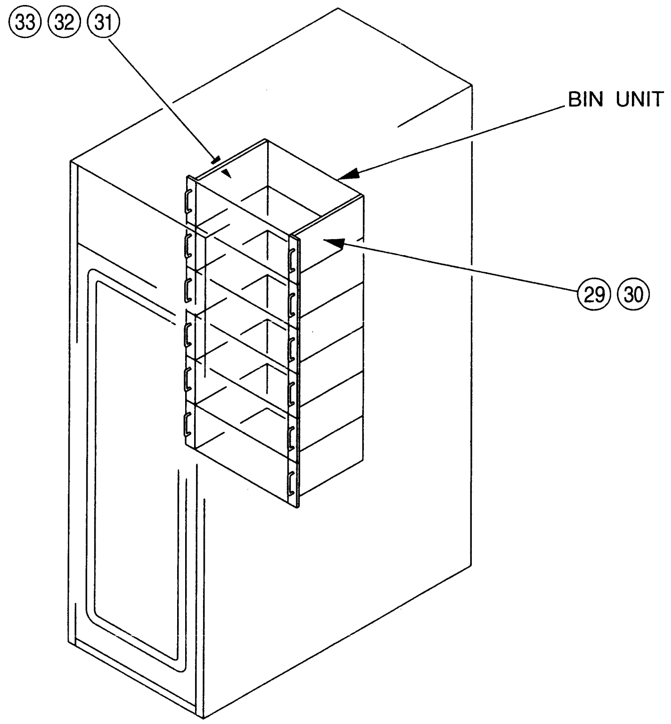


Fig-1.
SCREW (C)
(CAP 4X12)
SPRING
SCREW (C)
(CAP 4X12)
ADJUSTMENT SCREW
Fig-2.
BELT ADJUSTMENT PLATE
ADJUSTMENT SCREW
SCREW (E)
MOTOR BRACKET
Fig-3.
SCREW (D)
(PWH 3X6)
TIMING BELT (S)
Y PULLEY (UPPER) BRACKET (B)
MIDWAY PULLEY ASSEMBLY
Fig-4.
SCREW (E)
(PWH 4X8)
Y PULLEY (UPPER) SHAFT ASSEMBLY
TIMING BELT (S)

**Fig. 9-7-21. Y Drive Motor Assembly Component Removal**

# SECTION 11
# CIRCUIT BOARD FUNCTION





**Note**
∗1: Serial No. J ; 30035 and former
UC; 10169 and former
EK ; 20091 and former

① SE-193: PROTRUSION SENSOR (PHOTO EMITTER)
③ CB-50 : Y MOTOR HARNESS CONNECTION ∗1
④ SE-192: PROTRUSION SENSOR (PHOTO DETECTOR)
⑤ DP-178: DISPLAY PANEL CONTROL
⑥ SE-196: Y SENSOR
⑦ SE-196: X SENSOR
⑧ SE-197: CASSETTE A (RIGHT) SENSOR
⑨ SE-197: HAND ENCODER
⑩ SE-223: HAND LIMIT SENSOR

⑪ SE-197 : CASSETTE B (LEFT) SENSOR
⑫ CB-49 : CONNECTOR FOR HAND
⑬ SE-196 : Z SENSOR
⑭ SE-195 : X ENCODER
⑮ MT-65 : MOTOR CONNECTOR (X)
⑯ SE-195 : Z ENCODER
⑰ CB-48 : CONNECTOR FOR ELEVATOR
⑱ MT-65 : MOTOR CONNECTOR (Z)
⑲ CB-47 : ELEVATOR INTERFACE
⑳ IF-401 :INTERFACE IN CART

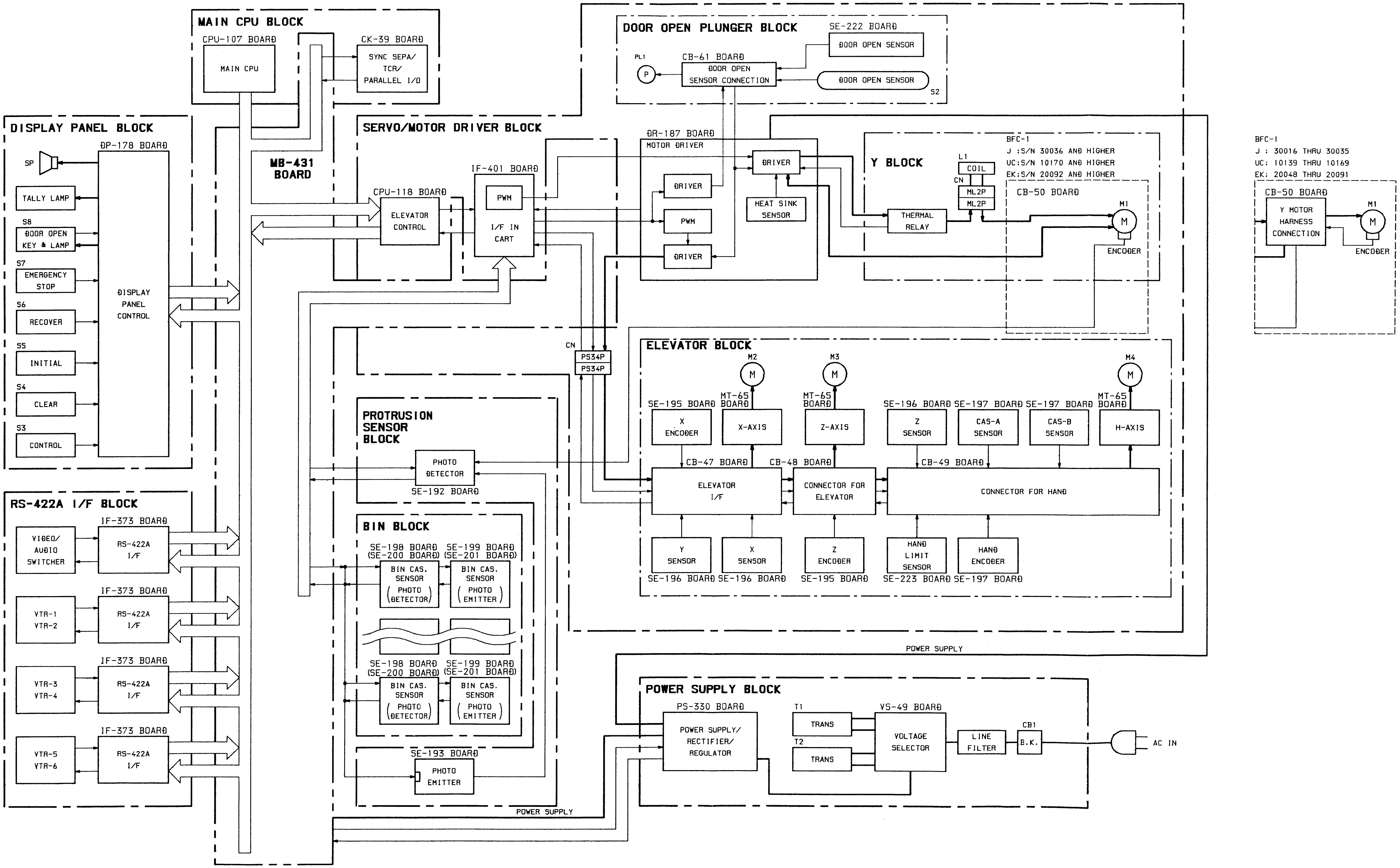
㉑ CPU-118: ELEVATOR CONTROL
㉒ CPU-107: MAIN CPU
㉓ IF-373 : RS-422A INTERFACE
㉔ CK-39 : SYNC SEPARATOR, TIME CODE READER, PARALLEL I/O
㉕ DR-187 : MOTOR DRIVER
㉖ MB-431 : MOTHER BOARD
㉗ VS-49 : VOLTAGE SELECTOR
㉘ PS-330 : POWER SUPPLY RECTIFIER/REGULATOR
㉙ SE-198 : BIN CASSETTE SENSOR (PHOTO DETECTOR FOR BKFC-10B, BKFC-10S)

㉚ SE-200 : BIN CASSETTE SENSOR (PHOTO DETECTOR FOR BKFC-8D)
㉛ SE-199A : BIN CASSETTE SENSOR (PHOTO EMITTER FOR BKFC-10B)
㉜ SE-199B : BIN CASSETTE SENSOR (PHOTO EMITTER FOR BKFC-10S)
㉝ SE-201 : BIN CASSETTE SENSOR (PHOTO EMITTER FOR BKFC-8D)
㉞ CB-61 : CONNECTOR FOR DOOR
㉟ SE-222 : DOOR SWITCH

# SECTION 12
# BLOCK DIAGRAMS

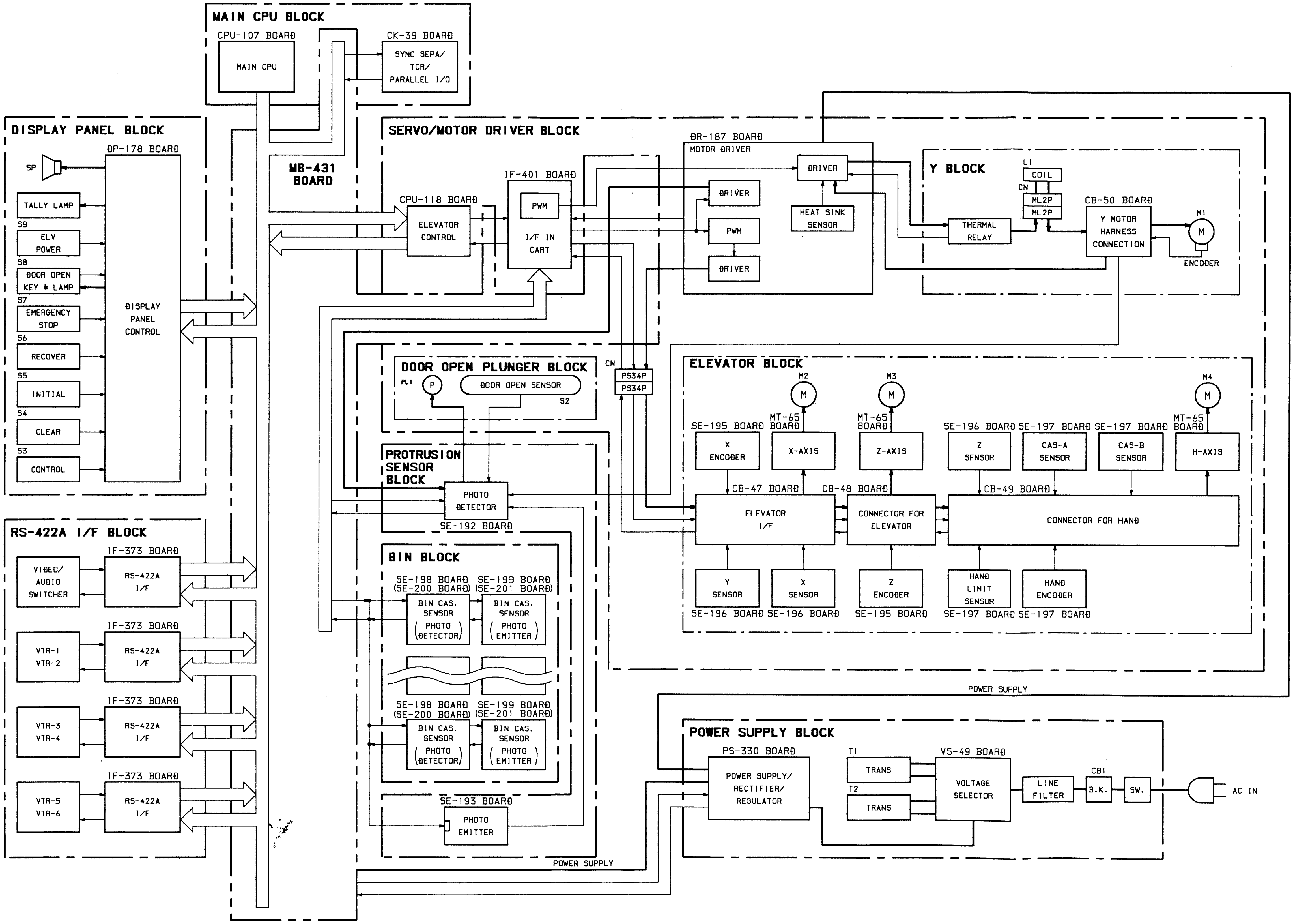
## OVERALL

J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher


MAIN CPU BLOCK
CPU-107 BOARD
MAIN CPU
CK-39 BOARD
SYNC SEPA/ TCR/ PARALLEL I/O
MB-431 BOARD
DISPLAY PANEL BLOCK
DP-178 BOARD
SP
TALLY LAMP
S8
DOOR OPEN KEY & LAMP
S7
EMERGENCY STOP
S6
RECOVER
S5
INITIAL
S4
CLEAR
S3
CONTROL
DISPLAY PANEL CONTROL
RS-422A I/F BLOCK
IF-373 BOARD
VIDEO/ AUDIO SWITCHER
RS-422A I/F
VTR-1 VTR-2
VTR-3 VTR-4
VTR-5 VTR-6
SERVO/MOTOR DRIVER BLOCK
IF-401 BOARD
CPU-118 BOARD
ELEVATOR CONTROL
PWM
I/F IN CART
DR-187 BOARD
MOTOR DRIVER
DRIVER
PWM
HEAT SINK SENSOR
DOOR OPEN PLUNGER BLOCK
SE-222 BOARD
DOOR OPEN SENSOR
PL1
P
CB-61 BOARD
DOOR OPEN SENSOR CONNECTION
S2
Y BLOCK
L1
COIL
CN
ML2P
THERMAL RELAY
BFC-1
J :S/N 30036 AND HIGHER
UC:S/N 10170 AND HIGHER
EK:S/N 20092 AND HIGHER
CB-50 BOARD
M1
M
ENCODER
BFC-1
J : 30016 THRU 30035
UC: 10139 THRU 10169
EK: 20048 THRU 20091
CB-50 BOARD
Y MOTOR HARNESS CONNECTION
M1
ENCODER
CN
PS34P
ELEVATOR BLOCK
M2
M3
M4
SE-195 BOARD
MT-65 BOARD
SE-196 BOARD
SE-197 BOARD
X ENCODER
X-AXIS
Z-AXIS
Z SENSOR
CAS-A SENSOR
CAS-B SENSOR
H-AXIS
CB-47 BOARD
CB-48 BOARD
CB-49 BOARD
ELEVATOR I/F
CONNECTOR FOR ELEVATOR
CONNECTOR FOR HAND
Y SENSOR
X SENSOR
Z ENCODER
HAND LIMIT SENSOR
HAND ENCODER
SE-196 BOARD
SE-195 BOARD
SE-223 BOARD
SE-197 BOARD
PROTRUSION SENSOR BLOCK
PHOTO DETECTOR
SE-192 BOARD
BIN BLOCK
SE-198 BOARD (SE-200 BOARD)
SE-199 BOARD (SE-201 BOARD)
BIN CAS. SENSOR (PHOTO DETECTOR)
BIN CAS. SENSOR (PHOTO EMITTER)
SE-193 BOARD
PHOTO EMITTER
POWER SUPPLY
POWER SUPPLY BLOCK
PS-330 BOARD
POWER SUPPLY/ RECTIFIER/ REGULATOR
T1
T2
TRANS
VS-49 BOARD
VOLTAGE SELECTOR
LINE FILTER
CB1
B.K.
AC IN

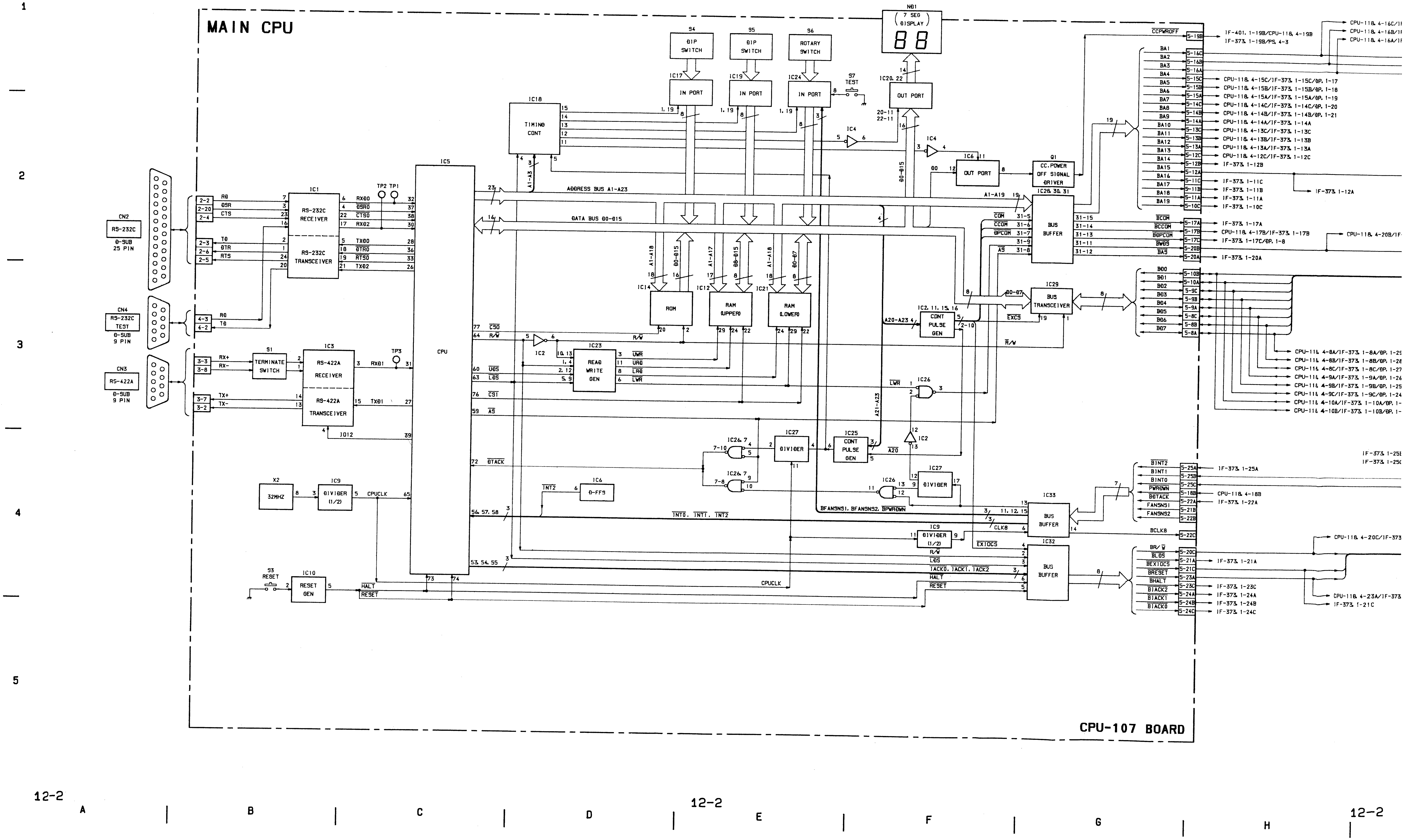
## OVERALL

J ; S/N 30001 thru 30015
UC ; S/N 10001 thru 10138
EK ; S/N 20001 thru 20047


MAIN CPU BLOCK
CPU-107 BOARD
MAIN CPU
CK-39 BOARD
SYNC SEPA/ TCR/ PARALLEL I/O
MB-431 BOARD
DISPLAY PANEL BLOCK
DP-178 BOARD
SP
TALLY LAMP
S9
ELV POWER
S8
DOOR OPEN KEY & LAMP
S7
EMERGENCY STOP
S6
RECOVER
S5
INITIAL
S4
CLEAR
S3
CONTROL
DISPLAY PANEL CONTROL
RS-422A I/F BLOCK
IF-373 BOARD
VIDEO/ AUDIO SWITCHER
RS-422A I/F
VTR-1 VTR-2
VTR-3 VTR-4
VTR-5 VTR-6
SERVO/MOTOR DRIVER BLOCK
CPU-118 BOARD
ELEVATOR CONTROL
IF-401 BOARD
PWM
I/F IN CART
DR-187 BOARD
MOTOR DRIVER
DRIVER
PWM
HEAT SINK SENSOR
Y BLOCK
L1
COIL
CN
ML2P
CB-50 BOARD
THERMAL RELAY
Y MOTOR HARNESS CONNECTION
M1
M
ENCODER
DOOR OPEN PLUNGER BLOCK
PL1
P
DOOR OPEN SENSOR
S2
CN
PS34P
PROTRUSION SENSOR BLOCK
PHOTO DETECTOR
SE-192 BOARD
BIN BLOCK
SE-198 BOARD (SE-200 BOARD)
SE-199 BOARD (SE-201 BOARD)
BIN CAS. SENSOR (PHOTO DETECTOR)
BIN CAS. SENSOR (PHOTO EMITTER)
SE-193 BOARD
PHOTO EMITTER
POWER SUPPLY
ELEVATOR BLOCK
M2
M3
M4
SE-195 BOARD
MT-65 BOARD
X ENCODER
X-AXIS
Z-AXIS
SE-196 BOARD
SE-197 BOARD
Z SENSOR
CAS-A SENSOR
CAS-B SENSOR
H-AXIS
CB-47 BOARD
CB-48 BOARD
CB-49 BOARD
ELEVATOR I/F
CONNECTOR FOR ELEVATOR
CONNECTOR FOR HAND
Y SENSOR
X SENSOR
Z ENCODER
HAND LIMIT SENSOR
HAND ENCODER
POWER SUPPLY BLOCK
PS-330 BOARD
POWER SUPPLY/ RECTIFIER/ REGULATOR
T1
T2
TRANS
VS-49 BOARD
VOLTAGE SELECTOR
LINE FILTER
CB1
B.K.
SW.
AC IN

# MAIN CPU

CPU-107 BOARD; MAIN CPU
CK-39 BOARD ; SYNC SEPARATOR
TIME CODE READER
PARALLEL I/O


MAIN CPU
CPU-107 BOARD
1
2
3
4
5
A
B
C
D
E
F
G
H
CN2
RS-232C
D-SUB 25 PIN
CN4
RS-232C TEST
D-SUB 9 PIN
CN3
RS-422A
D-SUB 9 PIN
2-2 RD
2-20 DSR
2-4 CTS
2-3 TD
2-6 DTR
2-5 RTS
4-3 RD
4-2 TD
3-3 RX+
3-8 RX-
3-7 TX+
3-2 TX-
IC1
RS-232C RECEIVER
RS-232C TRANSCEIVER
RXD0
DSR0
CTS0
RXD2
TXD0
DTR0
RTS0
TXD2
TP2
TP1
TP3
S1
TERMINATE SWITCH
IC3
RS-422A RECEIVER
RS-422A TRANSCEIVER
RXD1
TXD1
IO12
X2
32MHZ
IC9
DIVIDER (1/2)
CPUCLK
S3 RESET
IC10
RESET GEN
HALT
RESET
IC5
CPU
CSO
R/W
UDS
LDS
CS1
AS
BTACK
IC18
TIMING CONT
A1-A3
S4 DIP SWITCH
S5 DIP SWITCH
S6 ROTARY SWITCH
IC17 IN PORT
IC19 IN PORT
IC24 IN PORT
S7 TEST
IC20, 22 OUT PORT
ND1 (7 SEG DISPLAY)
IC4
IC6 OUT PORT
D0-D15
Q1 CC.POWER OFF SIGNAL DRIVER
ADDRESS BUS A1-A23
DATA BUS D0-D15
IC14 ROM
IC12 RAM (UPPER)
IC21 RAM (LOWER)
A1-A18
A1-A17
D0-D7
IC2
IC23 READ WRITE GEN
UWR
URD
LRD
LWR
IC28, 30, 31 BUS BUFFER
A1-A19
CON
CCOM
DPCOM
A5
IC29 BUS TRANSCEIVER
D0-D7
EXCS
IC2, 11, 15, 16 CONT PULSE GEN
A20-A23
A21-A23
IC26
IC27 DIVIDER
IC25 CONT PULSE GEN
A20
IC26, 7
IC6 D-FF
INT2
INT0, INT1, INT2
BFANSNS1, BFANSNS2, BPWRDWN
IC33 BUS BUFFER
CLK8
IC9 DIVIDER (1/2)
EXIOCS
IC32 BUS BUFFER
R/W
LDS
TACK0, TACK1, TACK2
HALT
RESET
CPUCLK
CCPWROFF 5-19B IF-401, 1-19B/CPU-118, 4-19B IF-373, 1-19B/PS, 4-3
CPU-118, 4-16C/IF
CPU-118, 4-16B/IF
CPU-118, 4-16A/IF
BA1 5-16C
BA2 5-16B
BA3 5-16A
BA4 5-15C CPU-118, 4-15C/IF-373, 1-15C/OP, 1-17
BA5 5-15B CPU-118, 4-15B/IF-373, 1-15B/OP, 1-18
BA6 5-15A CPU-118, 4-15A/IF-373, 1-15A/OP, 1-19
BA7 5-14C CPU-118, 4-14C/IF-373, 1-14C/OP, 1-20
BA8 5-14B CPU-118, 4-14B/IF-373, 1-14B/OP, 1-21
BA9 5-14A CPU-118, 4-14A/IF-373, 1-14A
BA10 5-13C CPU-118, 4-13C/IF-373, 1-13C
BA11 5-13B CPU-118, 4-13B/IF-373, 1-13B
BA12 5-13A CPU-118, 4-13A/IF-373, 1-13A
BA13 5-12C CPU-118, 4-12C/IF-373, 1-12C
BA14 5-12B IF-373, 1-12B
BA15 5-12A IF-373, 1-12A
BA16 5-11C IF-373, 1-11C
BA17 5-11B IF-373, 1-11B
BA18 5-11A IF-373, 1-11A
BA19 5-10C IF-373, 1-10C
BCON 5-17A IF-373, 1-17A
BCCOM 5-17B CPU-118, 4-17B/IF-373, 1-17B
BDPCOM 5-17C IF-373, 1-17C/OP, 1-8
BWDS 5-20B CPU-118, 4-20B/IF
BAS 5-20A IF-373, 1-20A
BD0 5-10B
BD1 5-10A
BD2 5-9C
BD3 5-9B
BD4 5-9A
BD5 5-8C
BD6 5-8B
BD7 5-8A
CPU-118, 4-8A/IF-373, 1-8A/OP, 1-29
CPU-118, 4-8B/IF-373, 1-8B/OP, 1-28
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CPU-118, 4-9A/IF-373, 1-9A/OP, 1-26
CPU-118, 4-9B/IF-373, 1-9B/OP, 1-25
CPU-118, 4-9C/IF-373, 1-9C/OP, 1-24
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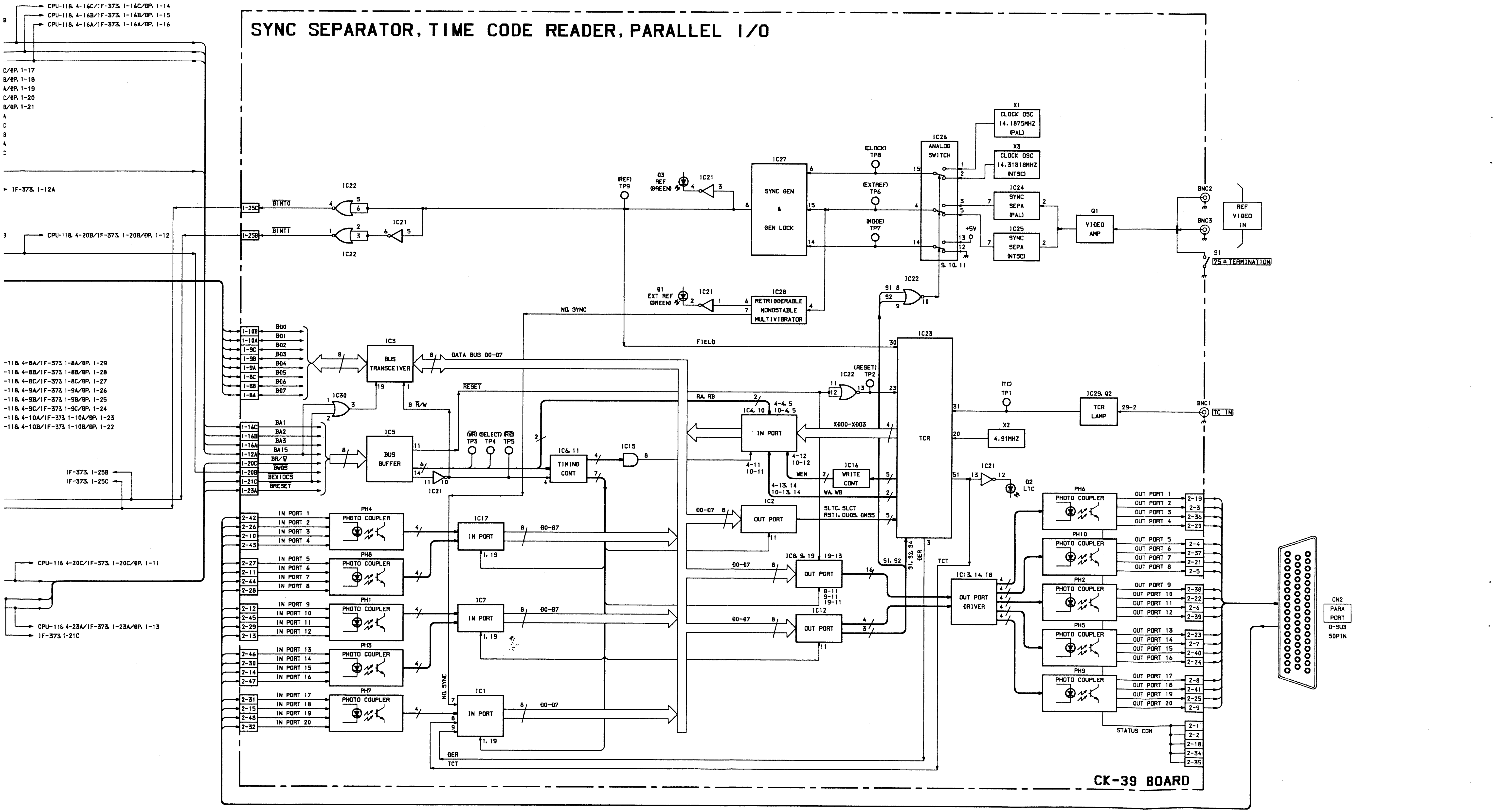
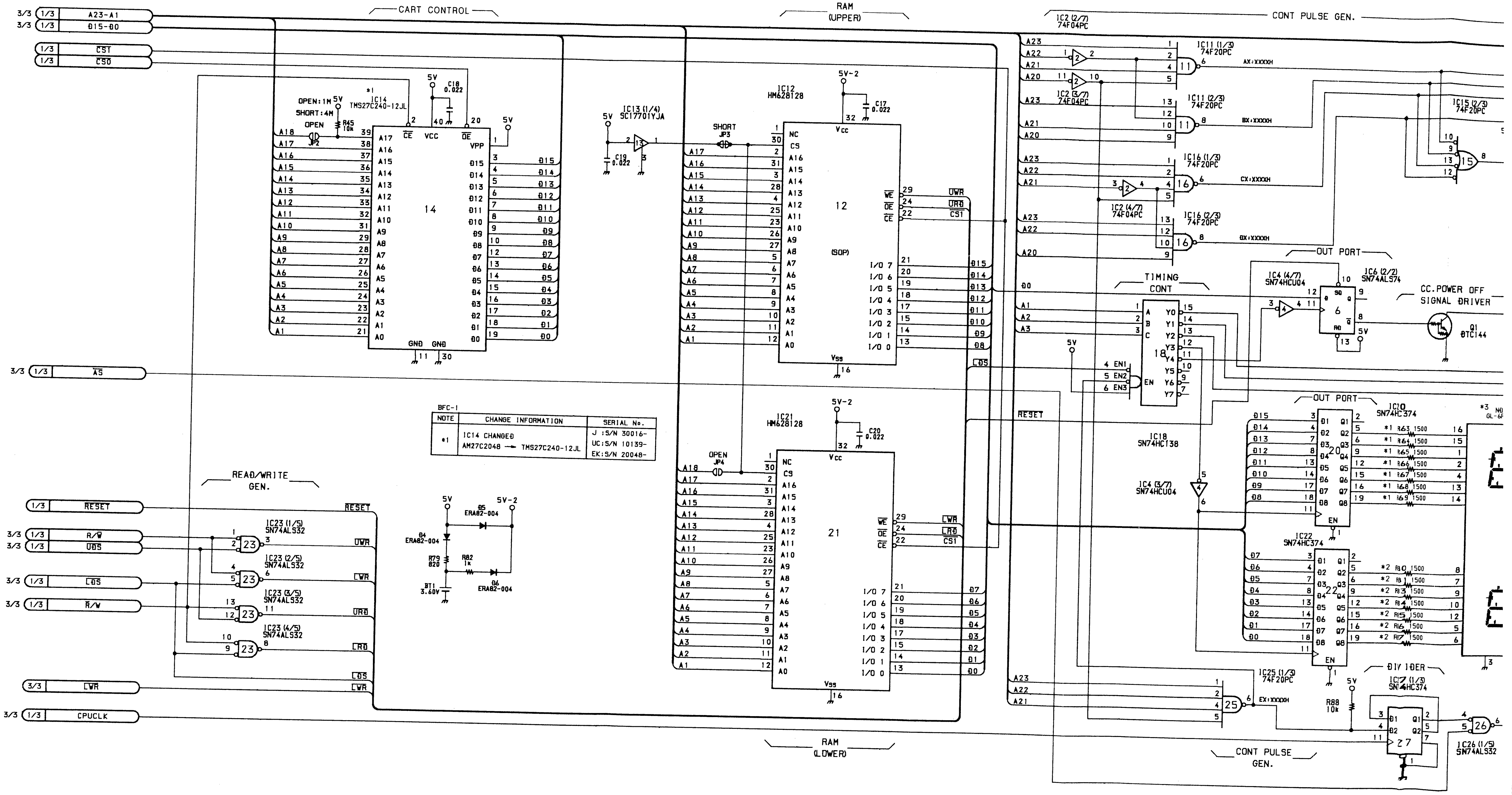
CPU-118, 4-10B/IF-373, 1-10B/OP, 1-
IF-373, 1-25B
IF-373, 1-25C
BINT2 5-25A IF-373, 1-25A
BINT1 5-25B
BINT0 5-25C
PWRDWN 5-18B CPU-118, 4-18B
BDTACK 5-22A IF-373, 1-22A
FANSNS1 5-21B
FANSNS2 5-22B
BCLK8 5-22C
BR/W 5-20C CPU-118, 4-20C/IF-373
BLDS 5-21A IF-373, 1-21A
BEXIOCS 5-21C
BRESET 5-23A
BHALT 5-23C IF-373, 1-23C
BIACK2 5-24A IF-373, 1-24A
BIACK1 5-24B IF-373, 1-24B
BIACK0 5-24C IF-373, 1-24C
CPU-118, 4-23A/IF-373
IF-373, 1-21C

# SYNC SEPARATOR, TIME CODE READER, PARALLEL I/O


CPU-11& 4-16C/IF-373 1-16C/BP. 1-14
CPU-11& 4-16B/IF-373 1-16B/BP. 1-15
CPU-11& 4-16A/IF-373 1-16A/BP. 1-16
IF-373 1-12A
CPU-11& 4-20B/IF-373 1-20B/BP. 1-12
IF-373 1-25B
IF-373 1-25C
CPU-11& 4-20C/IF-373 1-20C/BP. 1-11
CPU-11& 4-23A/IF-373 1-23A/BP. 1-13
IF-373 1-21C
BINT0
BINT1
IC22
IC21
IC27
SYNC GEN & GEN LOCK
IC26
ANALOG SWITCH
X1
CLOCK OSC 14.1875MHZ (PAL)
X3
CLOCK OSC 14.31818MHZ (NTSC)
IC24
SYNC SEPA (PAL)
IC25
SYNC SEPA (NTSC)
Q1
VIDEO AMP
BNC2
BNC3
REF VIDEO IN
S1
75 Ω TERMINATION
(CLOCK) TP8
(EXTREF) TP6
(MODE) TP7
(REF) TP9
D3 REF (GREEN)
D1 EXT REF (GREEN)
IC28
RETRIGGERABLE MONOSTABLE MULTIVIBRATOR
NO. SYNC
FIELD
IC23
TCR
IC3
BUS TRANSCEIVER
DATA BUS D0-D7
B00 B01 B02 B03 B04 B05 B06 B07
BA1 BA2 BA3 BA15 BR/W BWOS BEXIOCS BRESET
IC30
IC5
BUS BUFFER
B R/W
RESET
(WR) TP3
(SELECT) TP4
(RD) TP5
IC6, 11
TIMING CONT
IC15
(RESET) TP2
RA, RB
IC4, 10
IN PORT
X000-X003
IC16
WRITE CONT
WEN
WA, WB
IC2
OUT PORT
SLTC, SLCT RST1, OUOS, OMSS
IC8, 9, 19
IC12
IC13, 14, 18
OUT PORT DRIVER
(TC) TP1
IC29, Q2
TCR LAMP
BNC1
TC IN
X2
4.91MHZ
D2 LTC
PH4 PH8 PH1 PH3 PH7
PHOTO COUPLER
IN PORT 1 – IN PORT 20
IC17
IC7
IC1
PH6 PH10 PH2 PH5 PH9
OUT PORT 1 – OUT PORT 20
STATUS COM
CN2
PARA PORT
D-SUB 50PIN
OER
TCT
CK-39 BOARD

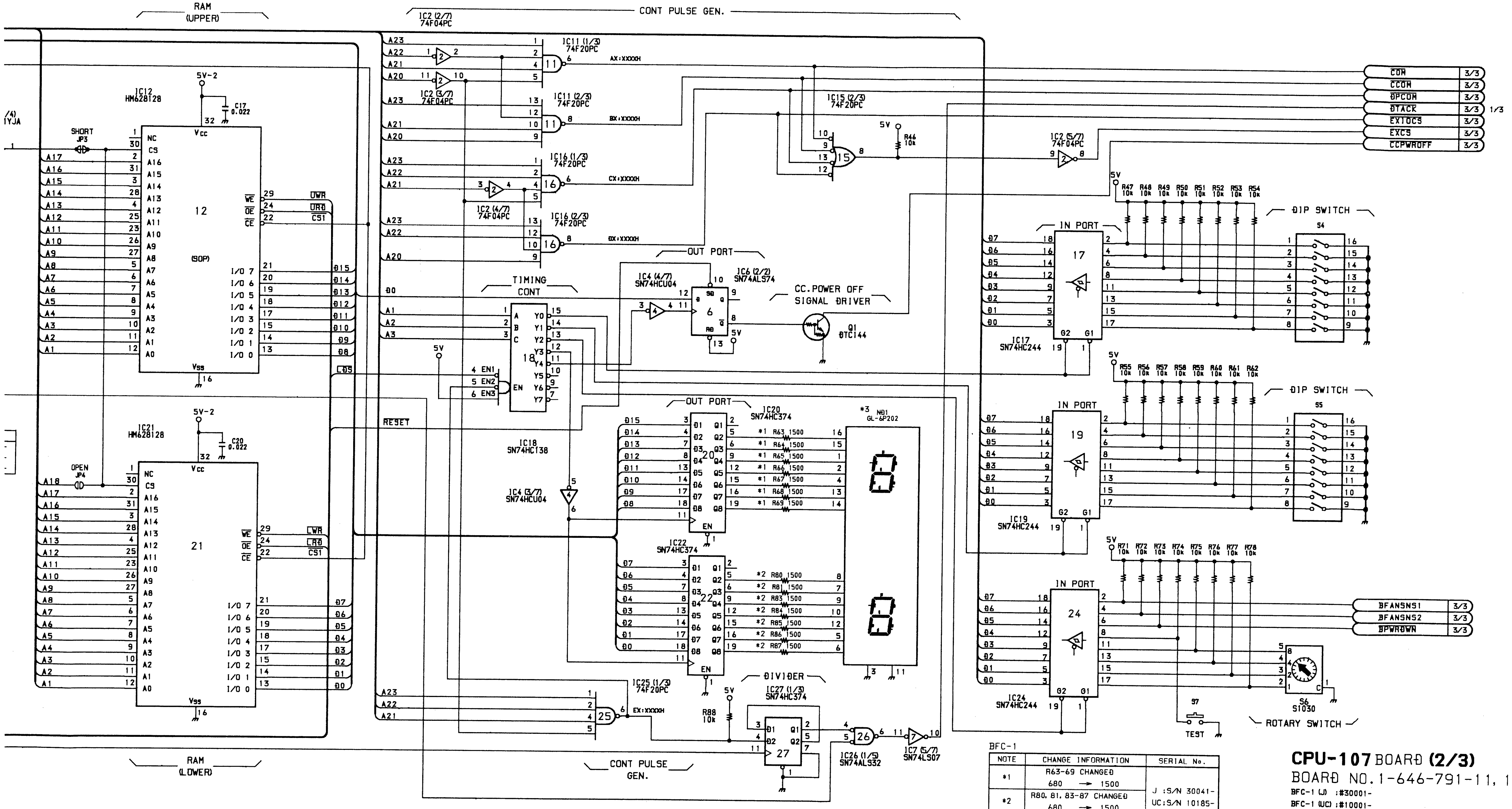
## CPU-107 BOARD (2/3)

Main CPU


CART CONTROL
RAM (UPPER)
RAM (LOWER)
CONT PULSE GEN.
TIMING CONT
OUT PORT
CC.POWER OFF SIGNAL DRIVER
READ/WRITE GEN.
DIVIDER
A23-A1
D15-D0
CS1
CS0
AS
RESET
R/W
UDS
LDS
LWR
CPUCLK
UWR
URD
LRD
IC14 TMS27C240-12JL
IC12 HM628128
IC21 HM628128
IC13 (1/4) SC17701YJA
IC23 (1/5) SN74ALS32
IC23 (2/5) SN74ALS32
IC23 (3/5) SN74ALS32
IC23 (4/5) SN74ALS32
IC2 (2/7) 74F04PC
IC2 (3/7) 74F04PC
IC2 (4/7) 74F04PC
IC11 (1/3) 74F20PC
IC11 (2/3) 74F20PC
IC16 (1/3) 74F20PC
IC16 (2/3) 74F20PC
IC15 (2/3) 74F20PC
IC18 SN74HC138
IC4 (4/7) SN74HCU04
IC4 (3/7) SN74HCU04
IC6 (2/2) SN74ALS74
IC10 SN74HC374
IC22 SN74HC374
IC25 (1/3) 74F20PC
IC7 (1/3) SN74HC374
IC26 (1/5) SN74ALS32
Q1 DTC144
OPEN:1M
SHORT:4M
OPEN JP2
SHORT JP3
OPEN JP4
R45 10k
C18 0.022
C17 0.022
C19 0.022
C20 0.022
D4 ERA82-004
D5 ERA82-004
D6 ERA82-004
R79 820
R82 1k
BT1 3.60V
R88 10k
5V
5V-2
AX:XXXXH
BX:XXXXH
CX:XXXXH
DX:XXXXH
EX:XXXXH
(SOP)

BFC-1

| NOTE | CHANGE INFORMATION | SERIAL No. |
|---|---|---|
| *1 | IC14 CHANGED<br>AM27C2048 → TMS27C240-12JL | J :S/N 30016-<br>UC:S/N 10139-<br>EK:S/N 20048- |


RAM (UPPER)
RAM (LOWER)
CONT PULSE GEN.
IC12 HM628128
IC21 HM628128
5V-2
C17 0.022
C20 0.022
SHORT JP3
OPEN JP4
(SOP)
IC2 (2/7) 74F04PC
IC2 (3/7) 74F04PC
IC2 (4/7) 74F04PC
IC2 (5/7) 74F04PC
IC11 (1/3) 74F20PC
IC11 (2/3) 74F20PC
IC15 (2/3) 74F20PC
IC16 (1/3) 74F20PC
IC16 (2/3) 74F20PC
IC25 (1/3) 74F20PC
AX:XXXXH
BX:XXXXH
CX:XXXXH
DX:XXXXH
EX:XXXXH
R46 10k
TIMING CONT
IC18 SN74HC138
OUT PORT
IC4 (4/7) SN74HCU04
IC4 (3/7) SN74HCU04
IC6 (2/2) SN74ALS574
CC.POWER OFF SIGNAL DRIVER
Q1 DTC144
RESET
IC20 SN74HC374
IC22 SN74HC374
*3 ND1 GL-6P202
R63-R69 1500
R80-R87 1500
DIVIDER
IC27 (1/3) SN74HC374
IC26 (1/5) SN74ALS32
IC7 (5/7) SN74LS07
R88 10k
IN PORT
IC17 SN74HC244
IC19 SN74HC244
IC24 SN74HC244
R47-R54 10k
R55-R62 10k
R71-R78 10k
DIP SWITCH
S4
S5
CDH 3/3
CCDH 3/3
DPCDH 3/3
DTACK 3/3 1/3
EXTDCS 3/3
EXCS 3/3
CCPWROFF 3/3
BFANSNS1 3/3
BFANSNS2 3/3
BPWRDWN 3/3
S7 TEST
S6 S1030
ROTARY SWITCH
(4) YJA

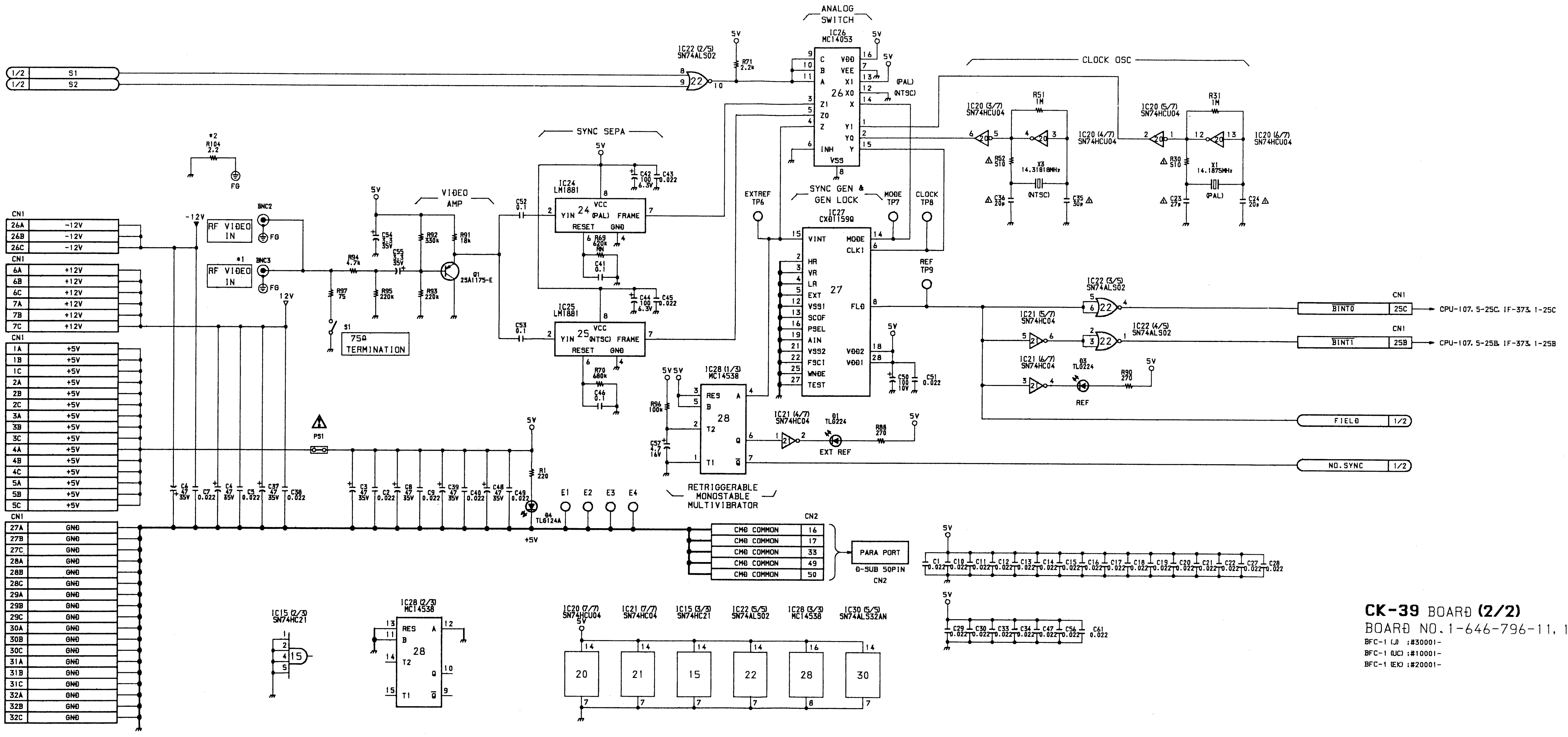
BFC-1

| NOTE | CHANGE INFORMATION | SERIAL No. |
|---|---|---|
| *1 | R63-69 CHANGED<br>680 → 1500 | J :S/N 30041-<br>UC:S/N 10185-<br>EK:S/N 20117- |
| *2 | R80, 81, 83-87 CHANGED<br>680 → 1500 | |
| *3 | ND1 CHANGED<br>GL-6R202 → GL-6P202 | |

**CPU-107** BOARD **(2/3)**
BOARD NO.1-646-791-11, 12
BFC-1 (J) :#30001-
BFC-1 (UC) :#10001-
BFC-1 (EK) :#20001-

# CK-39 BOARD (2/2)

SYNC Separator
Time Code Reader
Parallel I/O


1/2 S1
1/2 S2
IC22 (2/5) SN74ALS02
R71 2.2k
5V
ANALOG SWITCH
IC26 MC14053
C B A Z1 Z0 Z INH VSS VDD VEE X1 X0 X Y1 Y0 Y
(PAL)
(NTSC)
CLOCK OSC
IC20 (3/7) SN74HCU04
IC20 (4/7) SN74HCU04
IC20 (5/7) SN74HCU04
IC20 (6/7) SN74HCU04
R51 1M
R31 1M
R52 510
R30 510
X3 14.31818MHz
(NTSC)
X1 14.1875MHz
(PAL)
C36 20p
C35 30p
C23 27p
C24 20p
*2
R104 2.2
FG
SYNC SEPA
IC24 LM1881
YIN 24 VCC (PAL) FRAME RESET GND
R69 620k RN
C41 0.1
C42 100 6.3V
C43 0.022
IC25 LM1881
YIN 25 VCC (NTSC) FRAME RESET GND
R70 680k
C46 0.1
C44 100 6.3V
C45 0.022
C52 0.1
C53 0.1
VIDEO AMP
R92 330k
R91 18k
Q1 2SA1175-E
R94 4.7k
C54 3.3 35V
C55 3.3 35V
R97 75
R95 220k
R93 220k
S1
75Ω TERMINATION
BNC2
RF VIDEO IN
*1
BNC3
RF VIDEO IN
FG
-12V
12V
EXTREF TP6
SYNC GEN & GEN LOCK
IC27 CXD1159Q
MODE TP7
CLOCK TP8
VINT MODE CLK1 HR VR LR EXT VSS1 SCOF PSEL AIN VSS2 FSC1 WNDE TEST FLD VDD2 VDD1
REF TP9
C50 100 10V
C51 0.022
IC22 (3/5) SN74ALS02
IC21 (5/7) SN74HC04
IC22 (4/5) SN74ALS02
IC21 (6/7) SN74HC04
D3 TLG224
R90 270
REF
BINT0
BINT1
CN1 25C
CN1 25B
CPU-107, 5-25C, IF-373, 1-25C
CPU-107, 5-25B, IF-373, 1-25B
FIELD 1/2
NO.SYNC 1/2
IC28 (1/3) MC14538
RES B T2 T1 A Q Q̄
R96 100k
C57 4.7 16V
IC21 (4/7) SN74HC04
D1 TLG224
R88 270
EXT REF
RETRIGGERABLE MONOSTABLE MULTIVIBRATOR
CN1
26A -12V
26B -12V
26C -12V
CN1
6A +12V
6B +12V
6C +12V
7A +12V
7B +12V
7C +12V
CN1
1A +5V
1B +5V
1C +5V
2A +5V
2B +5V
2C +5V
3A +5V
3B +5V
3C +5V
4A +5V
4B +5V
4C +5V
5A +5V
5B +5V
5C +5V
CN1
27A GND
27B GND
27C GND
28A GND
28B GND
28C GND
29A GND
29B GND
29C GND
30A GND
30B GND
30C GND
31A GND
31B GND
31C GND
32A GND
32B GND
32C GND
PS1
R1 220
D4 TLG124A
+5V
C6 47 35V
C7 0.022
C4 47 35V
C5 0.022
C37 47 35V
C38 0.022
C3 47 35V
C2 0.022
C8 47 35V
C9 0.022
C39 47 35V
C40 0.022
C48 47 35V
C49 0.022
E1 E2 E3 E4
CN2
CMD COMMON 16
CMD COMMON 17
CMD COMMON 33
CMD COMMON 49
CMD COMMON 50
PARA PORT
D-SUB 50PIN
CN2
C1 C10 C11 C12 C13 C14 C15 C16 C17 C18 C19 C20 C21 C22 C27 C28 0.022
C29 C30 C33 C34 C47 C56 C61 0.022
IC15 (2/3) SN74HC21
IC28 (2/3) MC14538
IC20 (7/7) SN74HCU04
IC21 (7/7) SN74HC04
IC15 (3/3) SN74HC21
IC22 (5/5) SN74ALS02
IC28 (3/3) MC14538
IC30 (5/5) SN74ALS32AN
20 21 15 22 28 30

## CK-39 BOARD (2/2)

BOARD NO.1-646-796-11, 12, 13
BFC-1 (J) ;#30001-
BFC-1 (UC) ;#10001-
BFC-1 (EK) ;#20001-

BFC-1

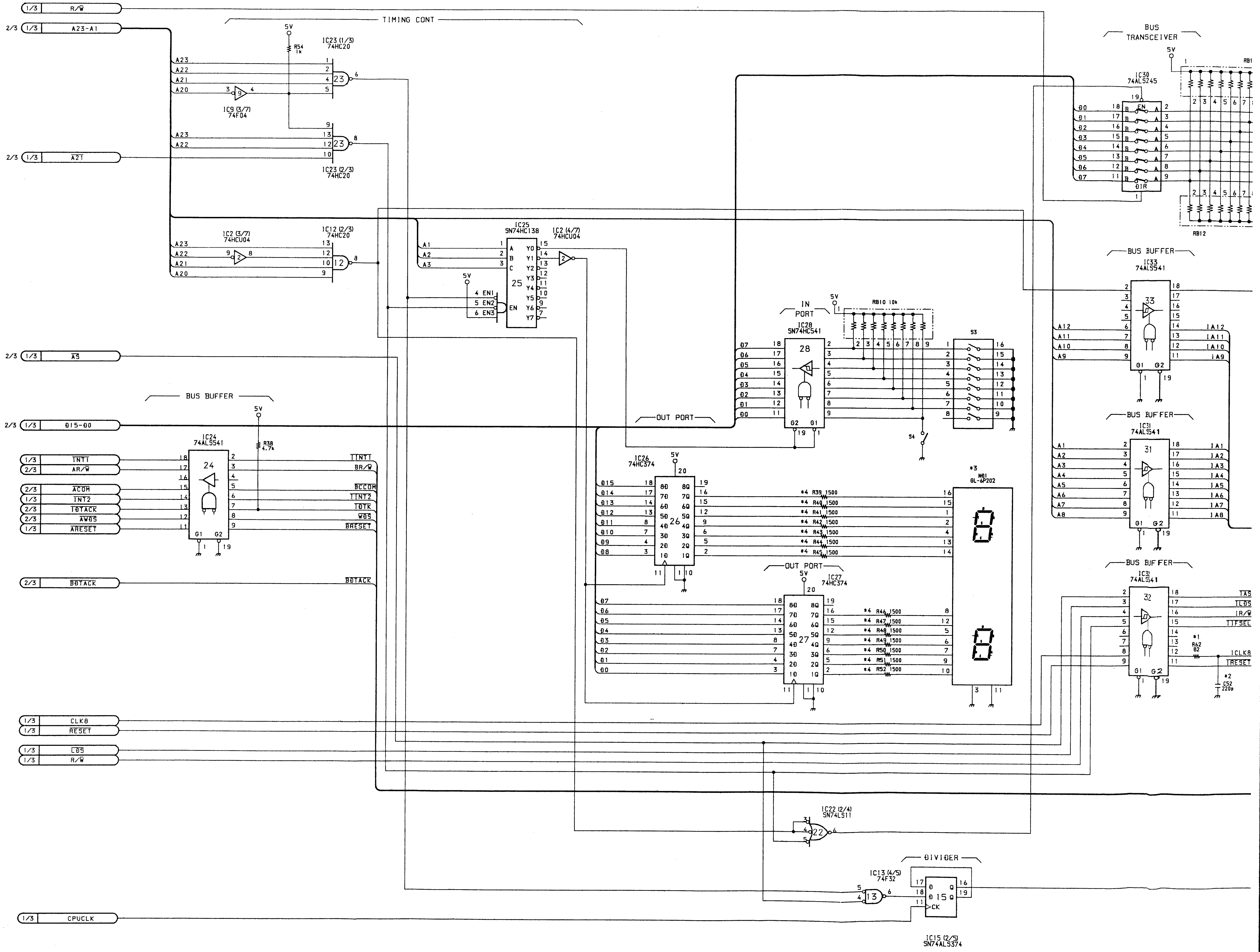
| NOTE | CHANGE INFORMATION | SERIAL No. |
|---|---|---|
| *1 | BNC3 DELETED | J :S/N 30016-<br>UC:S/N 10119-<br>EK:S/N 20038- |
| *2 | R104 2.2 ADDED | |

注意1: ⚠印のついた部品は安全性を維持するため
に重要な部品です。従って交換する時は必ず
指定の部品を使って下さい。

NOTE:
The ⚠-marked components are critical to sefety.
Replace only with same components as specified.

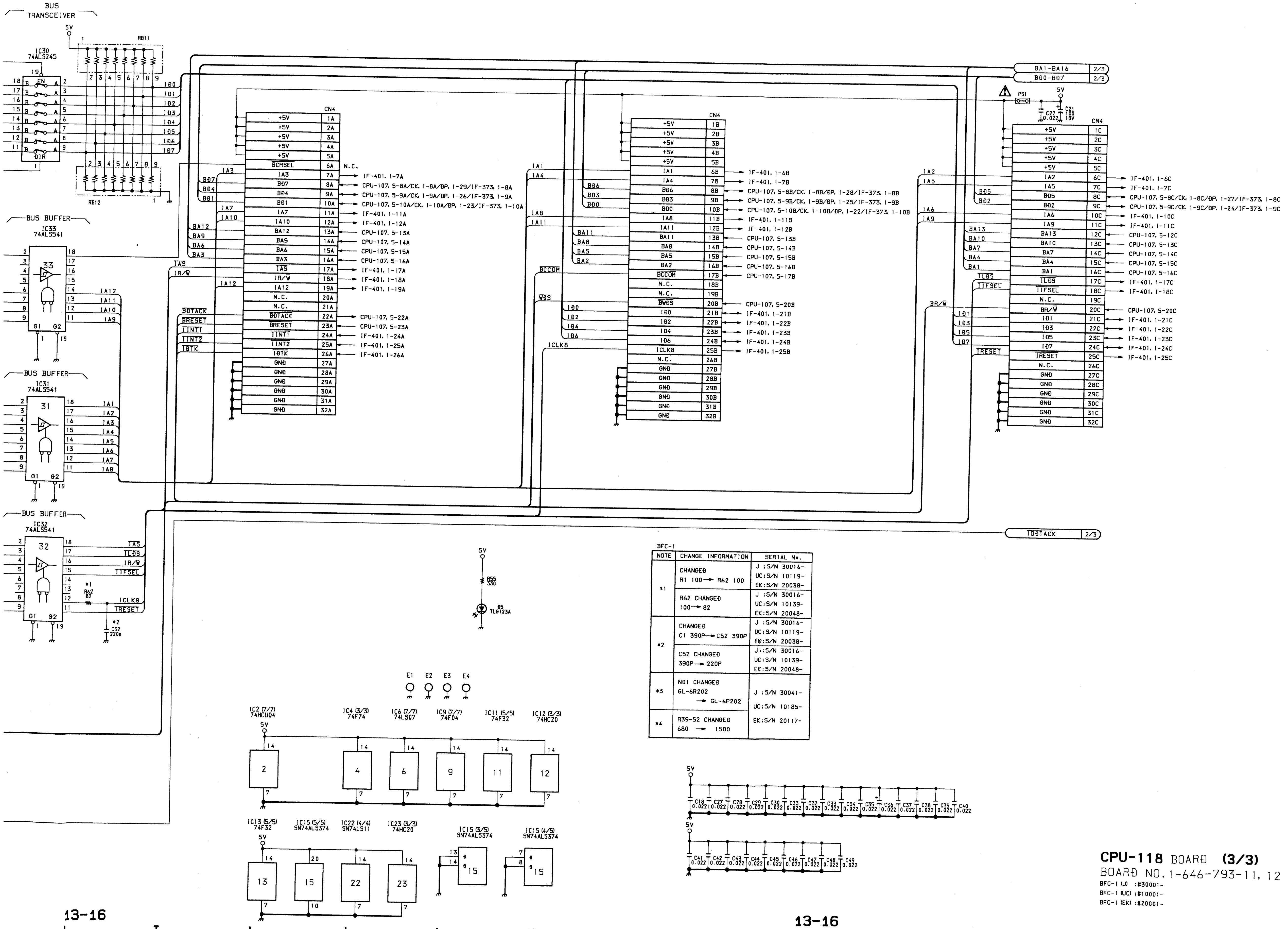
# CPU-118 BOARD (3/3)

Elevator Control


R/W
A23-A1
A21
A3
D15-D0
INT1
AR/W
ACOH
INT2
IDTACK
AWDS
ARESET
BDTACK
CLK8
RESET
LDS
R/W
CPUCLK
TIMING CONT
IC23 (1/3) 74HC20
IC23 (2/3) 74HC20
IC9 (3/7) 74F04
IC2 (3/7) 74HCU04
IC12 (2/3) 74HC20
IC25 SN74HC138
IC2 (4/7) 74HCU04
BUS BUFFER
IC24 74ALS541
R38 4.7k
R54 1k
IN PORT
IC28 SN74HC541
RB10 10k
S3
S4
OUT PORT
IC26 74HC374
IC27 74HC374
MB1 GL-6P202
R39–R45 1500
R46–R52 1500
BUS TRANSCEIVER
IC30 74ALS245
RB11
RB12
BUS BUFFER
IC33 74ALS541
IC31 74ALS541
IC32 74ALS541
R62 82
C52 220p
IC22 (2/4) SN74LS11
DIVIDER
IC13 (4/5) 74F32
IC15 (2/5) SN74ALS374
5V

注意1:　⚠印のついた部品は安全性を維持するため
に重要な部品です。従って交換する時は必ず
指定の部品を使って下さい。

NOTE:
The ⚠-marked components are critical to sefety.
Replace only with same components as specified.


BUS TRANSCEIVER
IC30 74ALS245
RB11
RB12
DIR
EN
BUS BUFFER
IC33 74ALS541
BUS BUFFER
IC31 74ALS541
BUS BUFFER
IC32 74ALS541
R62 82
C52 220p
BA1-BA16 2/3
B00-B07 2/3
IOOTACK 2/3
PS1
C22 0.022
C21 100 10V
CN4
+5V
BCRSEL
BCCOM
BWDS
BOTACK
BRESET
TINT1
TINT2
IOTK
ICLK8
BR/W
TLOS
TIFSEL
IRESET
IR/W
N.C.
GND
IF-401
CPU-107
R55 330
D5 TLG123A
E1 E2 E3 E4
IC2 (7/7) 74HCU04
IC4 (3/3) 74F74
IC6 (7/7) 74LS07
IC9 (7/7) 74F04
IC11 (5/5) 74F32
IC12 (3/3) 74HC20
IC13 (5/5) 74F32
IC15 (5/5) SN74ALS374
IC22 (4/4) SN74LS11
IC23 (3/3) 74HC20
IC15 (3/5) SN74ALS374
IC15 (4/5) SN74ALS374
5V
C18–C40 0.022
C41–C49 0.022
I
J
K
L
M
N
O
P

BFC-1

| NOTE | CHANGE INFORMATION | SERIAL No. |
|---|---|---|
| *1 | CHANGED<br>R1 100 → R62 100 | J :S/N 30016-<br>UC:S/N 10119-<br>EK:S/N 20038- |
|  | R62 CHANGED<br>100 → 82 | J :S/N 30016-<br>UC:S/N 10139-<br>EK:S/N 20048- |
| *2 | CHANGED<br>C1 390P → C52 390P | J :S/N 30016-<br>UC:S/N 10119-<br>EK:S/N 20038- |
|  | C52 CHANGED<br>390P → 220P | J :S/N 30016-<br>UC:S/N 10139-<br>EK:S/N 20048- |
| *3 | ND1 CHANGED<br>GL-6R202<br>→ GL-6P202 | J :S/N 30041-<br>UC:S/N 10185-<br>EK:S/N 20117- |
| *4 | R39-52 CHANGED<br>680 → 1500 |  |

**CPU-118** BOARD **(3/3)**
BOARD NO. 1-646-793-11, 12
BFC-1 (J) :#30001-
BFC-1 (UC) :#10001-
BFC-1 (EK) :#20001-

# IF-401 BOARD (1/3)

Interface In Cart

1

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3

4

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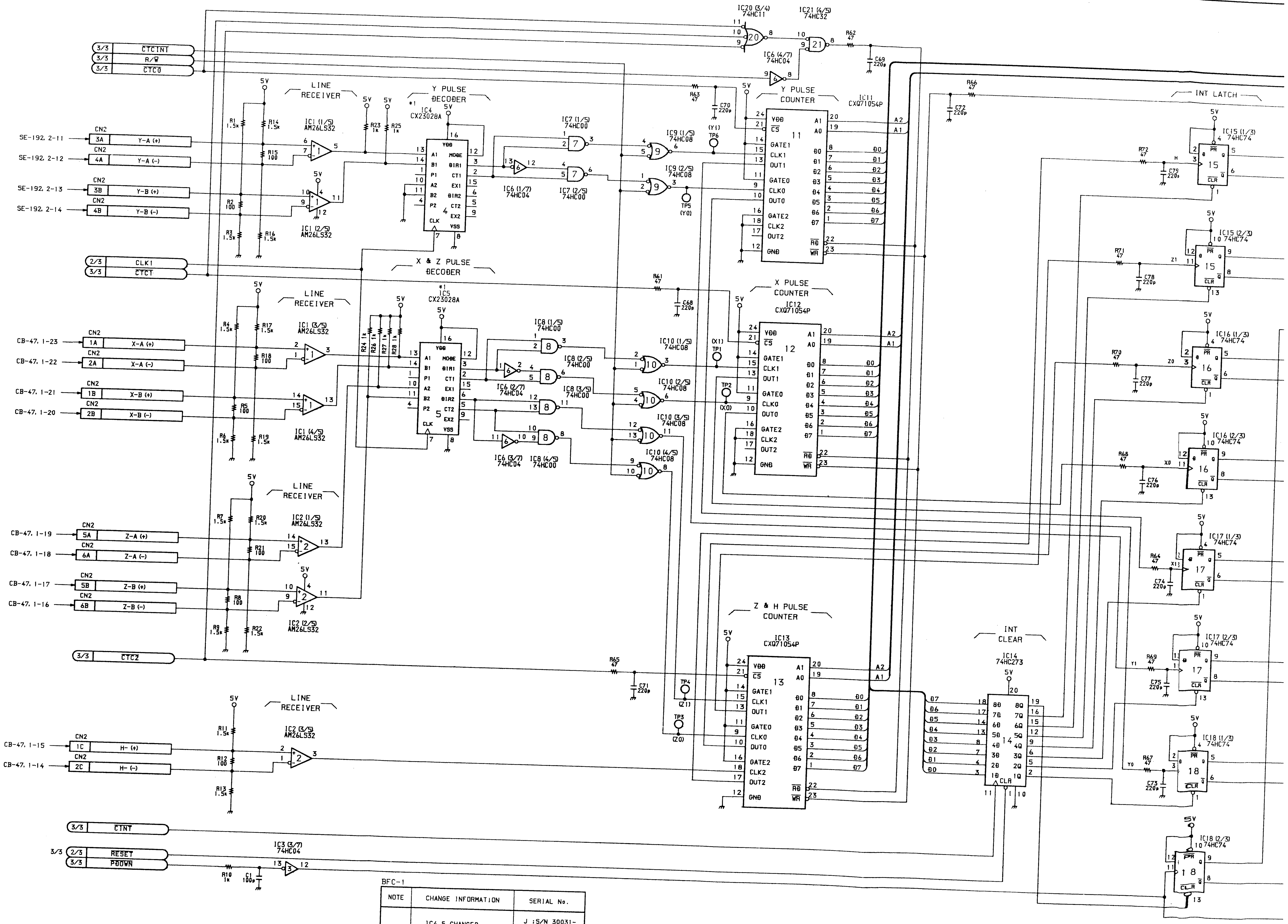
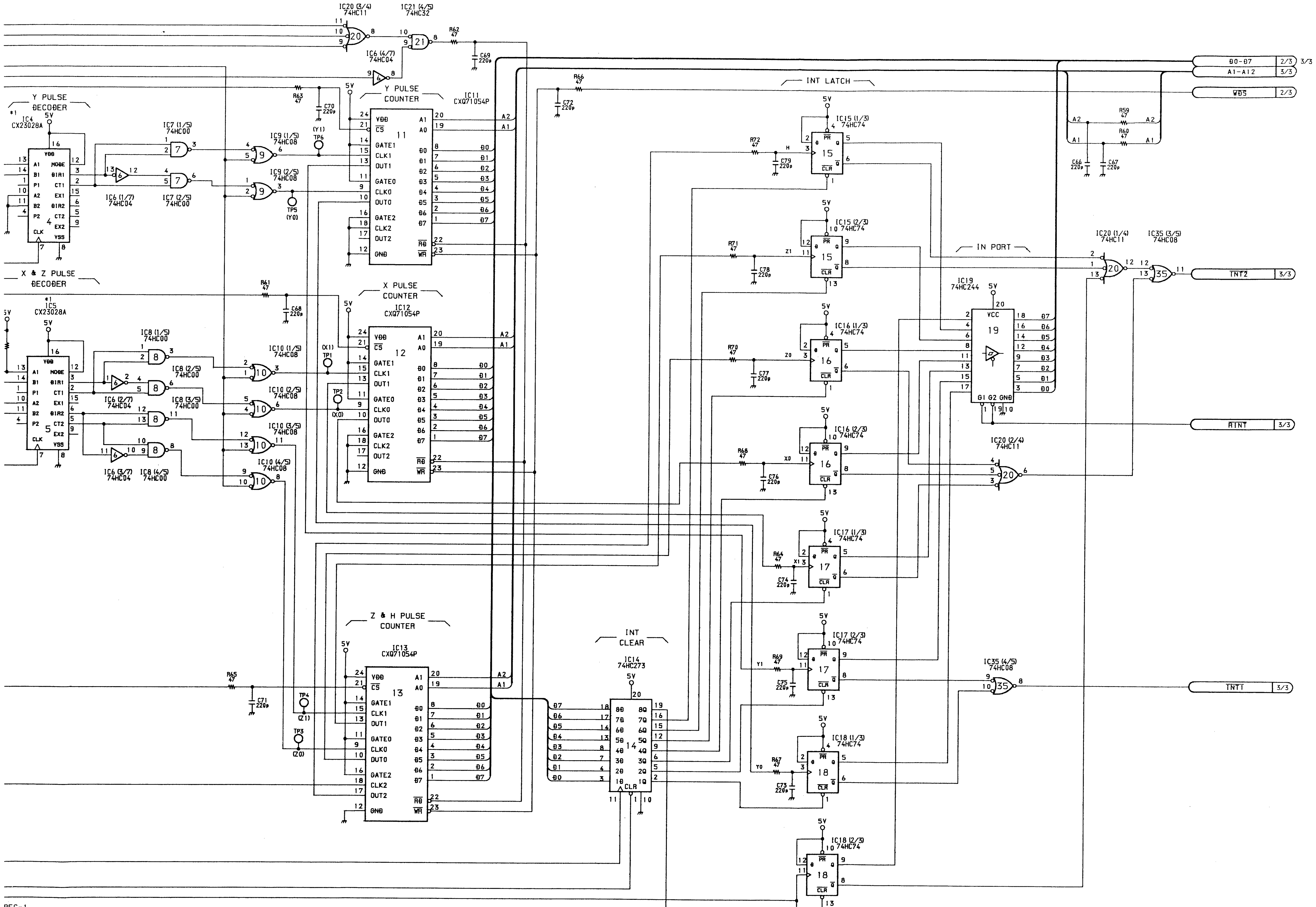

3/3 CTCINT
3/3 R/W
3/3 CTC0
2/3 CLK1
3/3 CTC1
3/3 CTC2
3/3 CTNT
3/3 2/3 RESET
3/3 PDOWN
SE-192, 2-11 CN2 3A Y-A (+)
SE-192, 2-12 CN2 4A Y-A (-)
SE-192, 2-13 CN2 3B Y-B (+)
SE-192, 2-14 CN2 4B Y-B (-)
CB-47, 1-23 CN2 1A X-A (+)
CB-47, 1-22 CN2 2A X-A (-)
CB-47, 1-21 CN2 1B X-B (+)
CB-47, 1-20 CN2 2B X-B (-)
CB-47, 1-19 CN2 5A Z-A (+)
CB-47, 1-18 CN2 6A Z-A (-)
CB-47, 1-17 CN2 5B Z-B (+)
CB-47, 1-16 CN2 6B Z-B (-)
CB-47, 1-15 CN2 1C H- (+)
CB-47, 1-14 CN2 2C H- (-)
LINE RECEIVER
IC1 (1/5) AM26LS32
IC1 (2/5) AM26LS32
IC1 (3/5) AM26LS32
IC1 (4/5) AM26LS32
IC2 (1/5) AM26LS32
IC2 (2/5) AM26LS32
IC2 (3/5) AM26LS32
Y PULSE DECODER
*1 IC4 CX23028A
X & Z PULSE DECODER
*1 IC5 CX23028A
A1 B1 P1 A2 B2 P2 CLK MODE ΦIR1 CT1 EX1 ΦIR2 CT2 EX2 VDD VSS
IC7 (1/5) 74HC00
IC7 (2/5) 74HC00
IC6 (1/7) 74HC04
IC9 (1/5) 74HC08
IC9 (2/5) 74HC08
IC8 (1/5) 74HC00
IC8 (2/5) 74HC00
IC8 (3/5) 74HC00
IC8 (4/5) 74HC00
IC6 (2/7) 74HC04
IC6 (3/7) 74HC04
IC10 (1/5) 74HC08
IC10 (2/5) 74HC08
IC10 (3/5) 74HC08
IC10 (4/5) 74HC08
IC20 (3/4) 74HC11
IC21 (4/5) 74HC32
IC6 (4/7) 74HC04
IC3 (3/7) 74HC04
TP1 (X1)
TP2 (X0)
TP3 (Z0)
TP4 (Z1)
TP5 (Y0)
TP6 (Y1)
Y PULSE COUNTER
IC11 CXQ71054P
X PULSE COUNTER
IC12 CXQ71054P
Z & H PULSE COUNTER
IC13 CXQ71054P
VDD CS GATE1 CLK1 OUT1 GATE0 CLK0 OUT0 GATE2 CLK2 OUT2 GND A1 A0 Ɖ0 Ɖ1 Ɖ2 Ɖ3 Ɖ4 Ɖ5 Ɖ6 Ɖ7 RD WR
INT CLEAR
IC14 74HC273
INT LATCH
IC15 (1/3) 74HC74
IC15 (2/3) 74HC74
IC16 (1/3) 74HC74
IC16 (2/3) 74HC74
IC17 (1/3) 74HC74
IC17 (2/3) 74HC74
IC18 (1/3) 74HC74
IC18 (2/3) 74HC74
PR CLR
5V
R1 1.5k R2 100 R3 1.5k R4 1.5k R5 100 R6 1.5k R7 1.5k R8 100 R9 1.5k R10 1k R11 1.5k R12 100 R13 1.5k R14 1.5k R15 100 R16 1.5k R17 1.5k R18 100 R19 1.5k R20 1.5k R21 100 R22 1.5k R23 1k R24 1k R25 1k R26 1k R27 1k R28 1k
R61 47 R62 47 R63 47 R64 47 R65 47 R66 47 R67 47 R68 47 R69 47 R70 47 R71 47 R72 47
C1 100p C68 220p C69 220p C70 220p C71 220p C72 220p C73 220p C74 220p C75 220p C76 220p C77 220p C78 220p C79 220p
A2 A1
X0 X1 Y0 Y1 Z0 Z1 H

BFC-1

| NOTE | CHANGE INFORMATION | SERIAL No. |
|---|---|---|
| *1 | IC4, 5 CHANGED<br>CX23028 → CX23028A | J :S/N 30031-<br>UC:S/N 10160-<br>EK:S/N 20082- |

A | B | C | D | 13-18 E | F | G | H


Y PULSE DECODER
IC4 CX23028A
X & Z PULSE DECODER
IC5 CX23028A
Y PULSE COUNTER
IC11 CXQ71054P
X PULSE COUNTER
IC12 CXQ71054P
Z & H PULSE COUNTER
IC13 CXQ71054P
INT CLEAR
IC14 74HC273
INT LATCH
IC15 (1/3) 74HC74
IC15 (2/3) 74HC74
IC16 (1/3) 74HC74
IC16 (2/3) 74HC74
IC17 (1/3) 74HC74
IC17 (2/3) 74HC74
IC18 (1/3) 74HC74
IC18 (2/3) 74HC74
IN PORT
IC19 74HC244
IC20 (1/4) 74HC11
IC20 (2/4) 74HC11
IC20 (3/4) 74HC11
IC21 (4/5) 74HC32
IC35 (3/5) 74HC08
IC35 (4/5) 74HC08
IC6 (1/7) 74HC04
IC6 (2/7) 74HC04
IC6 (3/7) 74HC04
IC6 (4/7) 74HC04
IC7 (1/5) 74HC00
IC7 (2/5) 74HC00
IC8 (1/5) 74HC00
IC8 (2/5) 74HC00
IC8 (3/5) 74HC00
IC8 (4/5) 74HC00
IC9 (1/5) 74HC08
IC9 (2/5) 74HC08
IC10 (1/5) 74HC08
IC10 (2/5) 74HC08
IC10 (3/5) 74HC08
IC10 (4/5) 74HC08
B0-B7 2/3 3/3
A1-A12 3/3
WDS 2/3
INT2 3/3
RINT 3/3
INT1 3/3
POWER 3/3
TP1 (X1)
TP2 (X0)
TP3 (Z0)
TP4 (Z1)
TP5 (Y0)
TP6 (Y1)
5V

BFC-1

| NOTE | CHANGE INFORMATION | SERIAL No. |
|---|---|---|
| *1 | IC4, 5 CHANGED<br>CX23028 → CX23028A | J :S/N 30031-<br>UC:S/N 10160-<br>EK:S/N 20082- |

**IF-401** BOARD **(1/3)**
BOARD NO. 1-646-794-11, 12
BFC-1 (J) :#30001-
BFC-1 (UC) :#10001-
BFC-1 (EK) :#20001-

# DR-187 BOARD (1/5)

Motor Driver

J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher

1

2

3

4

5

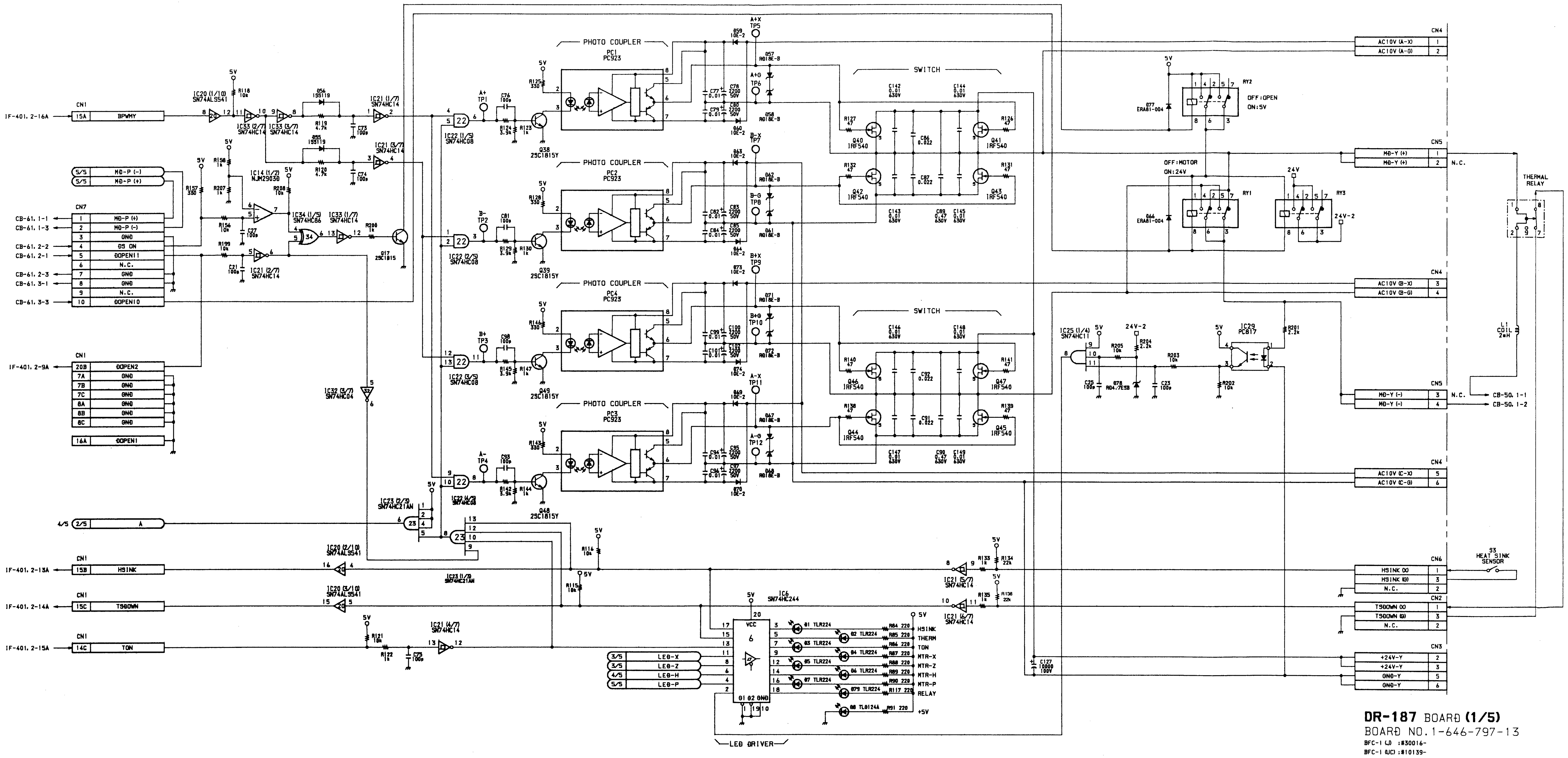


PHOTO COUPLER
PC1 PC923
PC2 PC923
PC4 PC923
PC3 PC923
SWITCH
Q40 IRF540
Q41 IRF540
Q42 IRF540
Q43 IRF540
Q44 IRF540
Q45 IRF540
Q46 IRF540
Q47 IRF540
Q38 2SC1815Y
Q39 2SC1815Y
Q48 2SC1815Y
Q49 2SC1815Y
A+X TP5
A+G TP6
B-X TP7
B-G TP8
B+X TP9
B+G TP10
A-X TP11
A-G TP12
A+ TP1
B- TP2
B+ TP3
A- TP4
IF-401, 2-16A
CN1
15A BPWMY
5/5 MO-P (-)
5/5 MO-P (+)
CN7
CB-61, 1-1
CB-61, 1-3
CB-61, 2-2
CB-61, 2-1
CB-61, 2-3
CB-61, 3-1
CB-61, 3-3
1 MO-P (+)
2 MO-P (-)
3 GND
4 DS ON
5 DOPEN11
6 N.C.
7 GND
8 GND
9 N.C.
10 DOPEN10
IF-401, 2-9A
20B DOPEN2
7A GND
7B GND
7C GND
8A GND
8B GND
8C GND
16A DOPEN1
4/5 2/5 A
IF-401, 2-13A
15B HSINK
IF-401, 2-14A
15C TSDOWN
IF-401, 2-15A
14C TON
IC20 (1/10) SN74ALS541
IC33 (2/7) SN74HC14
IC33 (3/7) SN74HC14
IC21 (1/7) SN74HC14
IC21 (3/7) SN74HC14
IC14 (1/2) NJM2903D
IC34 (1/5) SN74HC86
IC33 (1/7) SN74HC14
IC21 (2/7) SN74HC14
IC22 (1/5) SN74HC08
IC22 (2/5) SN74HC08
IC22 (3/5) SN74HC08
IC22 (4/5) SN74HC08
IC32 (3/7) SN74HC04
IC23 (2/3) SN74HC21AN
IC23 (1/3) SN74HC21AN
IC20 (2/10) SN74ALS541
IC20 (3/10) SN74ALS541
IC21 (4/7) SN74HC14
IC21 (5/7) SN74HC14
IC21 (6/7) SN74HC14
IC6 SN74HC244
LED DRIVER
3/5 LED-X
3/5 LED-Z
4/5 LED-H
5/5 LED-P
HSINK
THERM
TON
MTR-X
MTR-Z
MTR-H
MTR-P
RELAY
+5V
RY2
OFF:OPEN ON:5V
OFF:MOTOR ON:24V
RY1
RY3
24V-2
ERA81-004
IC25 (1/4) SN74HC11
IC29 PC817
CN4
AC10V (A-X) 1
AC10V (A-G) 2
CN5
MO-Y (+) 1
MO-Y (+) 2
N.C.
AC10V (B-X) 3
AC10V (B-G) 4
MO-Y (-) 3
MO-Y (-) 4
CB-50, 1-1
CB-50, 1-2
AC10V (C-X) 5
AC10V (C-G) 6
THERMAL RELAY
L1 COIL 2mH
S3 HEAT SINK SENSOR
CN6
HSINK (X) 1
HSINK (G) 3
N.C. 2
CN2
TSDOWN (X) 1
TSDOWN (G) 3
N.C. 2
CN3
+24V-Y 2
+24V-Y 3
GND-Y 5
GND-Y 6
C127 10000 100V

**DR-187 BOARD (1/5)**

BOARD NO. 1-646-797-13

BFC-1 (J) :#30016-
BFC-1 (UC) :#10139-
BFC-1 (EK) :#20048-

A | B | C | D | E | F | G | H

# MB-431 BOARD (1/2)

Mother Board

## IF-401

CN1 DIN48P

| | A | B | C |
|---|---|---|---|
| 1 | X-A (+) | X-B (+) | H- (+) |
| 2 | X-A (-) | X-B (-) | H- (-) |
| 3 | Y-A (+) | Y-B (+) | XORG |
| 4 | Y-A (-) | Y-B (-) | ZORG |
| 5 | Z-A (+) | Z-B (+) | HLIMIT |
| 6 | Z-A (-) | Z-B (-) | BININI |
| 7 | CASA | CASB | SBIN |
| 8 | N.C. | PRTSEL | SRESET |
| 9 | DOPEN2 | ELVCOM | SD0 |
| 10 | XPWM | SR/W | SD1 |
| 11 | ZPWM | SWDS | SD2 |
| 12 | SCLK | SA1 | SD3 |
| 13 | HSINK | SA2 | SD4 |
| 14 | TSDOWN | SA3 | SD5 |
| 15 | TON | SA4 | SD6 |
| 16 | BPWMY | SA5 | SD7 |

## IF-401

CN2 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | N.C. | IA1 | IA2 |
| 7 | IA3 | IA4 | IA5 |
| 8 | BMH (-) | N.C. | N.C. |
| 9 | BMH (+) | N.C. | N.C. |
| 10 | TIMING | N.C. | IA6 |
| 11 | IA7 | IA8 | IA9 |
| 12 | IA10 | IA11 | BA13 |
| 13 | BMZ (-) | N.C. | N.C. |
| 14 | BMZ (+) | N.C. | N.C. |
| 15 | N.C. | N.C. | N.C. |
| 16 | N.C. | N.C. | N.C. |
| 17 | IAS | N.C. | ILDS |
| 18 | IR/W | PWRDWN | IIFSEL |
| 19 | IA12 | CCPWROFF | N.C. |
| 20 | BMX (-) | N.C. | N.C. |
| 21 | BMX (+) | ID0 | ID1 |
| 22 | BMP (-) | ID2 | ID3 |
| 23 | BMP (+) | ID4 | ID5 |
| 24 | IINT1 | ID6 | ID7 |
| 25 | IINT2 | ICLK8 | IRESET |
| 26 | IDTK | IWDS | N.C. |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

BAR CODE

## AUX

CN3 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | BCRSEL | IA1 | IA2 |
| 7 | IA3 | IA4 | IA5 |
| 8 | N.C. | N.C. | N.C. |
| 9 | N.C. | N.C. | N.C. |
| 10 | TIMING | PENB | IA6 |
| 11 | IA7 | IA8 | IA9 |
| 12 | IA10 | IA11 | BA13 |
| 13 | N.C. | N.C. | N.C. |
| 14 | N.C. | N.C. | N.C. |
| 15 | BCRDATA (+) | N.C. | N.C. |
| 16 | BCRDATA (-) | N.C. | N.C. |
| 17 | IAS | N.C. | ILDS |
| 18 | IR/W | PWRDWN | IIFSEL |
| 19 | IA12 | CCPWROFF | IBCR |
| 20 | N.C. | N.C. | N.C. |
| 21 | N.C. | ID0 | ID1 |
| 22 | N.C. | ID2 | ID3 |
| 23 | BRESET | ID4 | ID5 |
| 24 | IINT1 | ID6 | ID7 |
| 25 | IINT2 | ICLK8 | IRESET |
| 26 | IDTK | IWDS | N.C. |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

## CPU-118

CN4 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | BCRSEL | IA1 | IA2 |
| 7 | IA3 | IA4 | IA5 |
| 8 | BD7 | BD6 | BD5 |
| 9 | BD4 | BD3 | BD2 |
| 10 | BD1 | BD0 | IA6 |
| 11 | IA7 | IA8 | IA9 |
| 12 | IA10 | IA11 | BA13 |
| 13 | BA12 | BA11 | BA10 |
| 14 | BA9 | BA8 | BA7 |
| 15 | BA6 | BA5 | BA4 |
| 16 | BA3 | BA2 | BA1 |
| 17 | IAS | BCCOM | ILDS |
| 18 | IR/W | PWRDWN | IIFSEL |
| 19 | IA12 | CCPWROFF | IBCR |
| 20 | BAS | BWDS | BR/W |
| 21 | N.C. | ID0 | ID1 |
| 22 | BDTACK | ID2 | ID3 |
| 23 | BRESET | ID4 | ID5 |
| 24 | IINT1 | ID6 | ID7 |
| 25 | IINT2 | ICLK8 | IRESET |
| 26 | IDTK | N.C. | N.C. |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

## C

CN5

| | A |
|---|---|
| 1 | +5V |
| 2 | +5V |
| 3 | +5V |
| 4 | +5V |
| 5 | +5V |
| 6 | N.C. |
| 7 | N.C. |
| 8 | BD7 |
| 9 | BD4 |
| 10 | BD1 |
| 11 | BA18 |
| 12 | BA15 |
| 13 | BA12 |
| 14 | BA9 |
| 15 | BA6 |
| 16 | BA3 |
| 17 | BCOM |
| 18 | N.C. |
| 19 | N.C. |
| 20 | BAS |
| 21 | BLDS |
| 22 | BDTACK |
| 23 | BRESET |
| 24 | BIACK2 |
| 25 | BINT2 |
| 26 | N.C. |
| 27 | GND |
| 28 | GND |
| 29 | GND |
| 30 | GND |
| 31 | GND |
| 32 | GND |

## IF-373 (SLOT NO. 7)

CN8 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | N.C. | N.C. | N.C. |
| 7 | N.C. | N.C. | N.C. |
| 8 | BD7 | BD6 | BD5 |
| 9 | BD4 | BD3 | BD2 |
| 10 | BD1 | BD0 | BA19 |
| 11 | BA18 | BA17 | BA16 |
| 12 | BA15 | BA14 | BA13 |
| 13 | BA12 | BA11 | BA10 |
| 14 | BA9 | BA8 | BA7 |
| 15 | BA6 | BA5 | BA4 |
| 16 | BA3 | BA2 | BA1 |
| 17 | BCOM | BCCOM | BDPCOM |
| 18 | GND (SA3) | PWRDWN | GND (SA2) |
| 19 | +5V (SA1) | CCPWROFF | GND (SA0) |
| 20 | BAS | BWDS | BR/W |
| 21 | BLDS | FANSNS1 | BEXIOCS |
| 22 | BDTACK | FANSNS2 | BCLK8 |
| 23 | BRESET | AUX | BHALT |
| 24 | BIACK2 | BIACK1 | BIACK0 |
| 25 | BINT2 | BINT1 | BINT0 |
| 26 | N.C. | N.C. | N.C. |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

## IF-373 (SLOT NO. 8)

CN9 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | | N.C. | N.C. |
| 7 | N.C. | N.C. | N.C. |
| 8 | BD7 | BD6 | BD5 |
| 9 | BD4 | BD3 | BD2 |
| 10 | BD1 | BD0 | BA19 |
| 11 | BA18 | BA17 | BA16 |
| 12 | BA15 | BA14 | BA13 |
| 13 | BA12 | BA11 | BA10 |
| 14 | BA9 | BA8 | BA7 |
| 15 | BA6 | BA5 | BA4 |
| 16 | BA3 | BA2 | BA1 |
| 17 | BCOM | BCCOM | BDPCOM |
| 18 | GND (SA3) | PWRDWN | GND (SA2) |
| 19 | +5V (SA1) | CCPWROFF | +5V (SA0) |
| 20 | BAS | BWDS | BR/W |
| 21 | BLDS | FANSNS1 | BEXIOCS |
| 22 | BDTACK | FANSNS2 | BCLK8 |
| 23 | BRESET | AUX | BHALT |
| 24 | BIACK2 | BIACK1 | BIACK0 |
| 25 | BINT2 | BINT1 | BINT0 |
| 26 | N.C. | N.C. | N.C. |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

## AUX

CN10 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | N.C. | N.C. | N.C. |
| 7 | N.C. | N.C. | N.C. |
| 8 | BD7 | BD6 | BD5 |
| 9 | BD4 | BD3 | BD2 |
| 10 | BD1 | BD0 | BA19 |
| 11 | BA18 | BA17 | BA16 |
| 12 | BA15 | BA14 | BA13 |
| 13 | BA12 | BA11 | BA10 |
| 14 | BA9 | BA8 | BA7 |
| 15 | BA6 | BA5 | BA4 |
| 16 | BA3 | BA2 | BA1 |
| 17 | BCOM | BCCOM | BDPCOM |
| 18 | GND (SA3) | PWRDWN | +5V (SA2) |
| 19 | GND (SA1) | CCPWROFF | GND (SA0) |
| 20 | BAS | BWDS | BR/W |
| 21 | BLDS | FANSNS1 | BEXIOCS |
| 22 | BDTACK | FANSNS2 | BCLK8 |
| 23 | BRESET | AUX | BHALT |
| 24 | BIACK2 | BIACK1 | BIACK0 |
| 25 | BINT2 | BINT1 | BINT0 |
| 26 | N.C. | N.C. | N.C. |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

## AUX

CN11 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | +12V | +12V | +12V |
| 7 | +12V | +12V | +12V |
| 8 | BD7 | BD6 | BD5 |
| 9 | BD4 | BD3 | BD2 |
| 10 | BD1 | BD0 | BA19 |
| 11 | BA18 | BA17 | BA16 |
| 12 | BA15 | BA14 | BA13 |
| 13 | BA12 | BA11 | BA10 |
| 14 | BA9 | BA8 | BA7 |
| 15 | BA6 | BA5 | BA4 |
| 16 | BA3 | BA2 | BA1 |
| 17 | BCOM | BCCOM | BDPCOM |
| 18 | GND (SA3) | PWRDWN | +5V (SA2) |
| 19 | GND (SA1) | CCPWROFF | +5V (SA0) |
| 20 | BAS | BWDS | BR/W |
| 21 | BLDS | FANSNS1 | BEXIOCS |
| 22 | BDTACK | FANSNS2 | BCLK8 |
| 23 | BRESET | AUX | BHALT |
| 24 | BIACK2 | BIACK1 | BIACK0 |
| 25 | BINT2 | BINT1 | BINT0 |
| 26 | -12V | -12V | -12V |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

CUE TONE

CN12

| | A |
|---|---|
| 1 | +5V |
| 2 | +5V |
| 3 | +5V |
| 4 | +5V |
| 5 | +5V |
| 6 | +12V |
| 7 | +12V |
| 8 | BD7 |
| 9 | BD4 |
| 10 | BD1 |
| 11 | BA18 |
| 12 | BA15 |
| 13 | BA12 |
| 14 | BA9 |
| 15 | BA6 |
| 16 | BA3 |
| 17 | BCOM |
| 18 | GND (SA3) |
| 19 | +5V (SA1) |
| 20 | BAS |
| 21 | BLDS |
| 22 | BDTACK |
| 23 | BRESET |
| 24 | BIACK2 |
| 25 | BINT2 |
| 26 | -12V |
| 27 | GND |
| 28 | GND |
| 29 | GND |
| 30 | GND |
| 31 | GND |
| 32 | GND |

## CPU-107

DIN96P

| A | B | C |
|---|---|---|
| +5V | +5V | +5V |
| +5V | +5V | +5V |
| +5V | +5V | +5V |
| +5V | +5V | +5V |
| +5V | +5V | +5V |
| .C. | N.C. | N.C. |
| .C. | N.C. | N.C. |
| 07 | B07 | B05 |
| 04 | B03 | B02 |
| 01 | B00 | BA19 |
| A18 | BA17 | BA16 |
| A15 | BA14 | BA13 |
| A12 | BA11 | BA10 |
| A9 | BA8 | BA7 |
| A6 | BA5 | BA4 |
| A3 | BA2 | BA1 |
| COM | BCCOM | BDPCOM |
| N.C. | PWRDWN | N.C. |
| N.C. | CCPWROFF | N.C. |
| AS | BWDS | BR/W |
| LDS | FANSNS1 | BEXIOCS |
| DTACK | FANSNS2 | BCLK8 |
| RESET | AUX | BHALT |
| IACK2 | BIACK1 | BIACK0 |
| INT2 | BINT1 | BINT0 |
| .C. | N.C. | N.C. |
| ND | GND | GND |
| ND | GND | GND |
| ND | GND | GND |
| ND | GND | GND |
| ND | GND | GND |
| ND | GND | GND |

## IF-373 (SLOT NO. 5)

CN6 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | N.C. | N.C. | N.C. |
| 7 | N.C. | N.C. | N.C. |
| 8 | BD7 | BD6 | BD5 |
| 9 | BD4 | BD3 | BD2 |
| 10 | BD1 | BD0 | BA19 |
| 11 | BA18 | BA17 | BA16 |
| 12 | BA15 | BA14 | BA13 |
| 13 | BA12 | BA11 | BA10 |
| 14 | BA9 | BA8 | BA7 |
| 15 | BA6 | BA5 | BA4 |
| 16 | BA3 | BA2 | BA1 |
| 17 | BCOM | BCCOM | BDPCOM |
| 18 | GND (SA3) | PWRDWN | GND (SA2) |
| 19 | GND (SA1) | CCPWROFF | GND (SA0) |
| 20 | BAS | BWDS | BR/W |
| 21 | BLDS | FANSNS1 | BEXIOCS |
| 22 | BDTACK | FANSNS2 | BCLK8 |
| 23 | BRESET | AUX | BHALT |
| 24 | BIACK2 | BIACK1 | BIACK0 |
| 25 | BINT2 | BINT1 | BINT0 |
| 26 | N.C. | N.C. | N.C. |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

## IF-373 (SLOT NO. 6)

CN7 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | N.C. | N.C. | N.C. |
| 7 | N.C. | N.C. | N.C. |
| 8 | BD7 | BD6 | BD5 |
| 9 | BD4 | BD3 | BD2 |
| 10 | BD1 | BD0 | BA19 |
| 11 | BA18 | BA17 | BA16 |
| 12 | BA15 | BA14 | BA13 |
| 13 | BA12 | BA11 | BA10 |
| 14 | BA9 | BA8 | BA7 |
| 15 | BA6 | BA5 | BA4 |
| 16 | BA3 | BA2 | BA1 |
| 17 | BCOM | BCCOM | BDPCOM |
| 18 | GND (SA3) | PWRDWN | GND (SA2) |
| 19 | GND (SA1) | CCPWROFF | +5V (SA0) |
| 20 | BAS | BWDS | BR/W |
| 21 | BLDS | FANSNS1 | BEXIOCS |
| 22 | BDTACK | FANSNS2 | BCLK8 |
| 23 | BRESET | AUX | BHALT |
| 24 | BIACK2 | BIACK1 | BIACK0 |
| 25 | BINT2 | BINT1 | BINT0 |
| 26 | N.C. | N.C. | N.C. |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

## DP-178

CN14 PS34P

| | |
|---|---|
| 1 | +5V |
| 2 | +5V |
| 3 | +5V |
| 4 | +5V |
| 5 | +12V |
| 6 | +12V |
| 7 | N.C. |
| 8 | BDPCOM |
| 9 | PWRDWN |
| 10 | BDTACK |
| 11 | BR/W |
| 12 | BWDS |
| 13 | BRESET |
| 14 | BA1 |
| 15 | BA2 |
| 16 | BA3 |
| 17 | BA4 |
| 18 | BA5 |
| 19 | BA6 |
| 20 | BA7 |
| 21 | BA8 |
| 22 | BD0 |
| 23 | BD1 |
| 24 | BD2 |
| 25 | BD3 |
| 26 | BD4 |
| 27 | BD5 |
| 28 | BD6 |
| 29 | BD7 |
| 30 | GND |
| 31 | GND |
| 32 | GND |
| 33 | GND |
| 34 | GND |

## SE-193/198/200

CN17 PS40P

| | |
|---|---|
| 1 | +5V |
| 2 | +5V |
| 3 | +5V |
| 4 | +5V |
| 5 | +5V |
| 6 | +5V |
| 7 | +5V |
| 8 | +5V |
| 9 | +5V |
| 10 | +5V |
| 11 | +5V |
| 12 | +5V |
| 13 | SRESET |
| 14 | SBIN |
| 15 | SR/W |
| 16 | SWDS |
| 17 | SA1 |
| 18 | SA2 |
| 19 | SA3 |
| 20 | SA4 |
| 21 | SD0 |
| 22 | SD1 |
| 23 | SD2 |
| 24 | SD3 |
| 25 | SD4 |
| 26 | SD5 |
| 27 | SD6 |
| 28 | SD7 |
| 29 | GND |
| 30 | GND |
| 31 | GND |
| 32 | GND |
| 33 | GND |
| 34 | GND |
| 35 | GND |
| 36 | GND |
| 37 | GND |
| 38 | GND |
| 39 | GND |
| 40 | GND |

## CB-47

CN19 PS34P

| | |
|---|---|
| 1 | MD-H (-) |
| 2 | MD-H (+) |
| 3 | MD-Z (-) |
| 4 | MD-Z (+) |
| 5 | MD-X (-) |
| 6 | MD-X (+) |
| 7 | +5V (DR) |
| 8 | +5V (DR) |
| 9 | +5V (DR) |
| 10 | TIMING |
| 11 | BCRDATA (-) |
| 12 | BCRDATA (+) |
| 13 | PENB |
| 14 | H- (-) |
| 15 | H- (+) |
| 16 | Z-B (-) |
| 17 | Z-B (+) |
| 18 | Z-A (-) |
| 19 | Z-A (+) |
| 20 | X-B (-) |
| 21 | X-B (+) |
| 22 | X-A (-) |
| 23 | X-A (+) |
| 24 | ELVCOM |
| 25 | BININI |
| 26 | HLIMIT |
| 27 | CASB |
| 28 | CASA |
| 29 | ZORG |
| 30 | XORG |
| 31 | GND |
| 32 | GND |
| 33 | GND |
| 34 | GND |

## AUX

DIN96P

| A | B | C |
|---|---|---|
| 5V | +5V | +5V |
| 5V | +5V | +5V |
| 5V | +5V | +5V |
| 5V | +5V | +5V |
| 5V | +5V | +5V |
| 12V | +12V | +12V |
| 12V | +12V | +12V |
| 07 | BD6 | BD5 |
| 04 | BD3 | BD2 |
| 01 | BD0 | BA19 |
| A18 | BA17 | BA16 |
| A15 | BA14 | BA13 |
| A12 | BA11 | BA10 |
| A9 | BA8 | BA7 |
| A6 | BA5 | BA4 |
| A3 | BA2 | BA1 |
| OM | BCCOM | BDPCOM |
| D (SA3) | PWRDWN | +5V (SA2) |
| V (SA1) | CCPWROFF | GND (SA0) |
| S | BWDS | BR/W |
| DS | FANSNS1 | BEXIOCS |
| TACK | FANSNS2 | BCLK8 |
| ESET | AUX | BHALT |
| ACK2 | BIACK1 | BIACK0 |
| NT2 | BINT1 | BINT0 |
| 2V | -12V | -12V |
| D | GND | GND |
| D | GND | GND |
| D | GND | GND |
| D | GND | GND |
| D | GND | GND |
| D | GND | GND |

CUE TONE

## CK-39

CN13 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | +5V | +5V | +5V |
| 2 | +5V | +5V | +5V |
| 3 | +5V | +5V | +5V |
| 4 | +5V | +5V | +5V |
| 5 | +5V | +5V | +5V |
| 6 | +12V | +12V | +12V |
| 7 | +12V | +12V | +12V |
| 8 | BD7 | BD6 | BD5 |
| 9 | BD4 | BD3 | BD2 |
| 10 | BD1 | BD0 | BA19 |
| 11 | BA18 | BA17 | BA16 |
| 12 | BA15 | BA14 | BA13 |
| 13 | BA12 | BA11 | BA10 |
| 14 | BA9 | BA8 | BA7 |
| 15 | BA6 | BA5 | BA4 |
| 16 | BA3 | BA2 | BA1 |
| 17 | BCOM | BCCOM | BDPCOM |
| 18 | GND (SA3) | PWRDWN | +5V (SA2) |
| 19 | +5V (SA1) | CCPWROFF | +5V (SA0) |
| 20 | BAS | BWDS | BR/W |
| 21 | BLDS | FANSNS1 | BEXIOCS |
| 22 | BDTACK | FANSNS2 | BCLK8 |
| 23 | BRESET | AUX | BHALT |
| 24 | BIACK2 | BIACK1 | BIACK0 |
| 25 | BINT2 | BINT1 | BINT0 |
| 26 | -12V | -12V | -12V |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

## DR-187

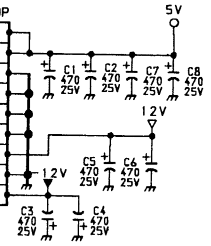
CN20 DIN96P

| | A | B | C |
|---|---|---|---|
| 1 | MD-H (-) | MD-H (-) | MD-H (-) |
| 2 | MD-H (+) | MD-H (+) | MD-H (+) |
| 3 | MD-Z (-) | MD-Z (-) | MD-Z (-) |
| 4 | MD-Z (+) | MD-Z (+) | MD-Z (+) |
| 5 | MD-X (-) | MD-X (-) | MD-X (-) |
| 6 | MD-X (+) | MD-X (+) | MD-X (+) |
| 7 | MD-P (-) *1 | MD-P (-) *1 | MD-P (-) *1 |
| 8 | MD-P (+) *1 | MD-P (+) *1 | MD-P (+) *1 |
| 9 | +5V (DR) | +5V (DR) | +5V (DR) |
| 10 | +5V (DR) | +5V (DR) | +5V (DR) |
| 11 | +5V (DR) | +5V (DR) | +5V (DR) |
| 12 | BMX (+) | BMX (-) | BMZ (+) |
| 13 | BMZ (-) | BMH (+) | BMH (-) |
| 14 | BMP (+) | BMP (-) | TON |
| 15 | BPWMY | HSINK | TSDOWN |
| 16 | DOPEN1 *1 | XPWM *1 | ZPWM *1 |
| 17 | SRESET | SD0 | SD1 |
| 18 | SD2 | SD3 | SD4 |
| 19 | SD5 | SD6 | SD7 |
| 20 | SCLK | DOPEN2 | GND |
| 21 | GND | GND | GND |
| 22 | GND | GND | GND |
| 23 | GND | GND | GND |
| 24 | GND | GND | GND |
| 25 | GND | GND | GND |
| 26 | GND | GND | GND |
| 27 | GND | GND | GND |
| 28 | GND | GND | GND |
| 29 | GND | GND | GND |
| 30 | GND | GND | GND |
| 31 | GND | GND | GND |
| 32 | GND | GND | GND |

## PS-330

CN15 MEITEN9P

| | |
|---|---|
| 1 | +5V |
| 2 | +5V |
| 3 | GND |
| 4 | GND |
| 5 | GND |
| 6 | GND |
| 7 | +12V |
| 8 | GND |
| 9 | -12V |



## PS-330

CN16 ILG8P

| | |
|---|---|
| 1 | PWRDWN |
| 2 | GND |
| 3 | CCPWROFF |
| 4 | GND |
| 5 | FANSNS1 |
| 6 | GND |
| 7 | FANSNS2 |
| 8 | GND |

## SE-192

CN18 PS26P

| | |
|---|---|
| 1 | +5V |
| 2 | +5V |
| 3 | +5V |
| 4 | +5V |
| 5 | +5V |
| 6 | +5V |
| 7 | +5V |
| 8 | PRTSEL |
| 9 | SD0 |
| 10 | SD1 |
| 11 | Y-A (+) |
| 12 | Y-A (-) |
| 13 | Y-B (+) |
| 14 | Y-B (-) |
| 15 | DOPEN1 *1 |
| 16 | GND |
| 17 | GND |
| 18 | GND |
| 19 | GND |
| 20 | GND |
| 21 | GND |
| 22 | GND |
| 23 | MD-P (+) *1 |
| 24 | MD-P (+) *1 |
| 25 | MD-P (-) *1 |
| 26 | MD-P (-) *1 |

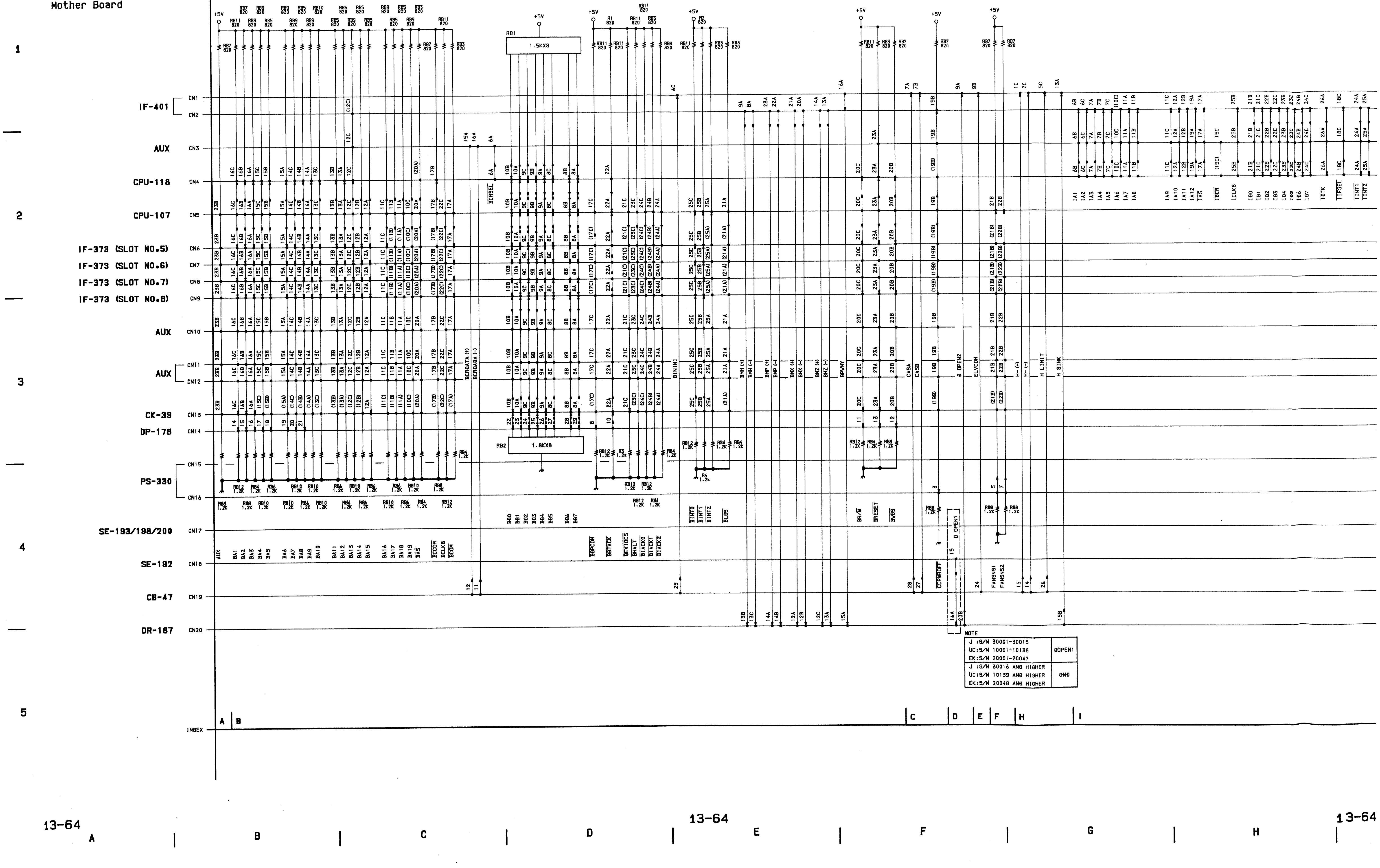
*1

| | J :S/N 30001-30015<br>UC:S/N 10001-10138<br>EK:S/N 20001-20047 | J :S/N 30016 AND HIGHER<br>UC:S/N 10139 AND HIGHER<br>EK:S/N 20048 AND HIGHER |
|---|---|---|
| CN18-15 | DOPEN1 | GND |
| CN18-23 | MD-P (+) | GND |
| CN18-24 | MD-P (+) | GND |
| CN18-25 | MD-P (-) | GND |
| CN18-26 | MD-P (-) | GND |
| CN20-7A | MD-P (-) | GND |
| CN20-7B | MD-P (-) | GND |
| CN20-7C | MD-P (-) | GND |
| CN20-8A | MD-P (+) | GND |
| CN20-8B | MD-P (+) | GND |
| CN20-8C | MD-P (+) | GND |
| CN20-16A | DOPEN1 | GND |
| CN20-16B | XPWM | XPWM |
| CN20-16C | ZPWM | ZPWM |

**MB-431** BOARD**(1/2)**
BOARD NO.1-646-814-11, 12, 13
BFC-1 (J) ;#30001-
BFC-1 (UC) ;#10001-
BFC-1 (EK) ;#20001-

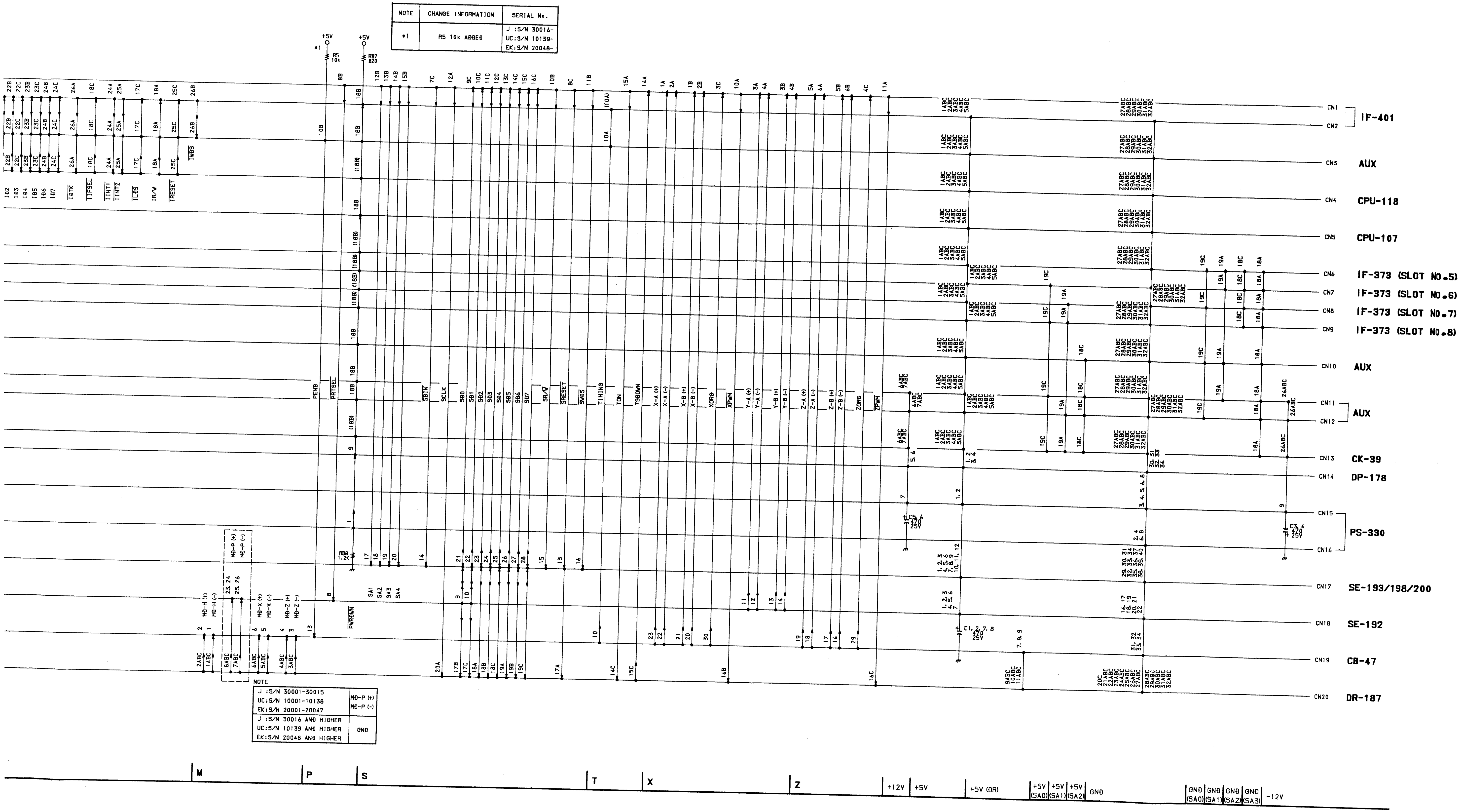
# MB-431 BOARD (2/2)

Mother Board


IF-401 CN1 CN2
AUX CN3
CPU-118 CN4
CPU-107 CN5
IF-373 (SLOT NO.5) CN6
IF-373 (SLOT NO.6) CN7
IF-373 (SLOT NO.7) CN8
IF-373 (SLOT NO.8) CN9
AUX CN10
AUX CN11 CN12
CK-39 CN13
DP-178 CN14
PS-330 CN15 CN16
SE-193/198/200 CN17
SE-192 CN18
CB-47 CN19
DR-187 CN20
INDEX
+5V
RB1 1.5KX8
RB2 1.8KX8
BCRSEL
BCRBATA (+)
BCRBABA (-)
BININ1
BMH (+)
BMH (-)
BMP (+)
BMP (-)
BMX (+)
BMX (-)
BMZ (+)
BMZ (-)
BPWMY
CASA
CASB
Ð OPEN2
ELVCOM
H+ (+)
H- (-)
H LIMIT
H SINK
BD0 BD1 BD2 BD3 BD4 BD5 BD6 BD7
AUX BA1 BA2 BA3 BA4 BA5 BA6 BA7 BA8 BA9 BA10 BA11 BA12 BA13 BA14 BA15 BA16 BA17 BA18 BA19 BAS
BCCOM BCLK8 BCOM
BDPCOM BDTACK BEXIOCS BHALT BIACK0 BIACK1 BIACK2
BINT0 BINT1 BINT2 BLDS
BR/W BRESET BWDS
CCPWROFF
Ð OPEN1
FANSNS1 FANSNS2
IA1 IA2 IA3 IA4 IA5 IA6 IA7 IA8 IA9 IA10 IA11 IA12 IAS
IBCR ICLK8
ID0 ID1 ID2 ID3 ID4 ID5 ID6 ID7
IDTK IIFSEL IINT1 IINT2
1 2 3 4 5
A B C D E F G H
A B C D E F H I

NOTE

| | |
|---|---|
| J :S/N 30001-30015<br>UC:S/N 10001-10138<br>EK:S/N 20001-20047 | ÐOPEN1 |
| J :S/N 30016 AND HIGHER<br>UC:S/N 10139 AND HIGHER<br>EK:S/N 20048 AND HIGHER | GND |


+5V
R5 10k
*1
R87 820
R88 2k
IO2
IO3
IO4
IO5
IO6
IO7
TDTK
TIFSEL
TINT1
TINT2
ILOS
IR/V
TRESET
TWDS
PENB
PRTSEL
SBTN
SCLK
SD0
SD1
SD2
SD3
SD4
SD5
SD6
SD7
SR/W
SRESET
SWDS
TIMING
TON
TSBDWN
X-A (+)
X-A (-)
X-B (+)
X-B (-)
XORG
XPWM
Y-A (+)
Y-A (-)
Y-B (+)
Y-B (-)
Z-A (+)
Z-A (-)
Z-B (+)
Z-B (-)
ZORG
ZPWM
PWRDWN
SA1
SA2
SA3
SA4
MD-H (+)
MD-H (-)
MD-P (+)
MD-P (-)
MD-X (+)
MD-X (-)
MD-Z (+)
MD-Z (-)
C5 470 25V
C3,4 470 25V
C1,2,7,8 470 25V
CN1
CN2
IF-401
CN3
AUX
CN4
CPU-118
CN5
CPU-107
CN6
IF-373 (SLOT NO.5)
CN7
IF-373 (SLOT NO.6)
CN8
IF-373 (SLOT NO.7)
CN9
IF-373 (SLOT NO.8)
CN10
AUX
CN11
CN12
AUX
CN13
CK-39
CN14
DP-178
CN15
CN16
PS-330
CN17
SE-193/198/200
CN18
SE-192
CN19
CB-47
CN20
DR-187
M
P
S
T
X
Z
+12V
+5V
+5V (DR)
+5V (SA0)
+5V (SA1)
+5V (SA2)
GND
GND (SA0)
GND (SA1)
GND (SA2)
GND (SA3)
-12V

| NOTE | CHANGE INFORMATION | SERIAL No. |
|---|---|---|
| *1 | R5 10k ADDED | J :S/N 30016-<br>UC:S/N 10139-<br>EK:S/N 20048- |

NOTE

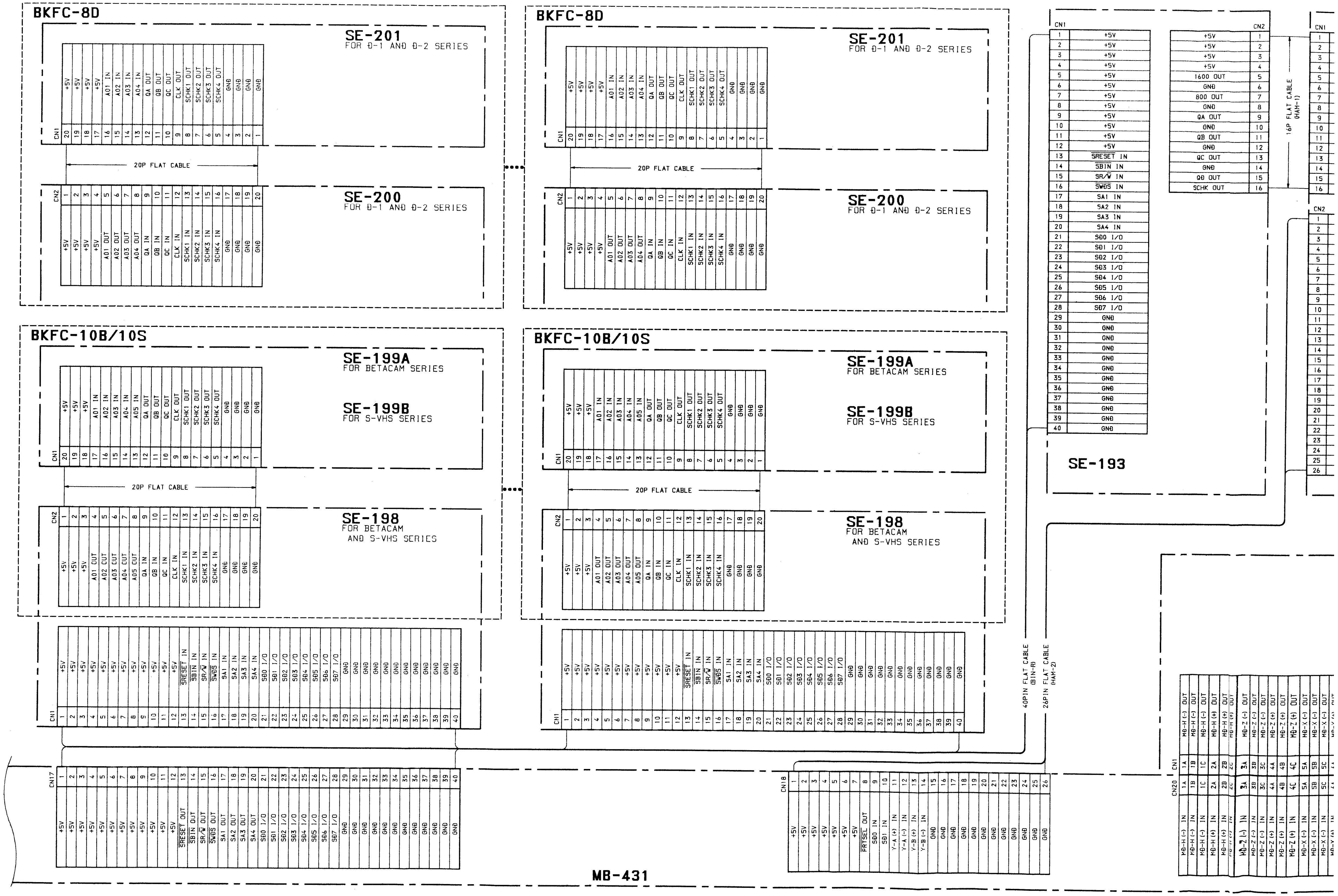
| | |
|---|---|
| J :S/N 30001-30015<br>UC:S/N 10001-10138<br>EK:S/N 20001-20047 | MD-P (+)<br>MD-P (-) |
| J :S/N 30016 AND HIGHER<br>UC:S/N 10139 AND HIGHER<br>EK:S/N 20048 AND HIGHER | GND |

**MB-431** BOARD **(2/2)**
BOARD NO.1-646-814-11, 12, 13
BFC-1 (J) :#30001-
BFC-1 (UC) :#10001-
BFC-1 (EK) :#20001-

# FRAME WIRING (2/4)

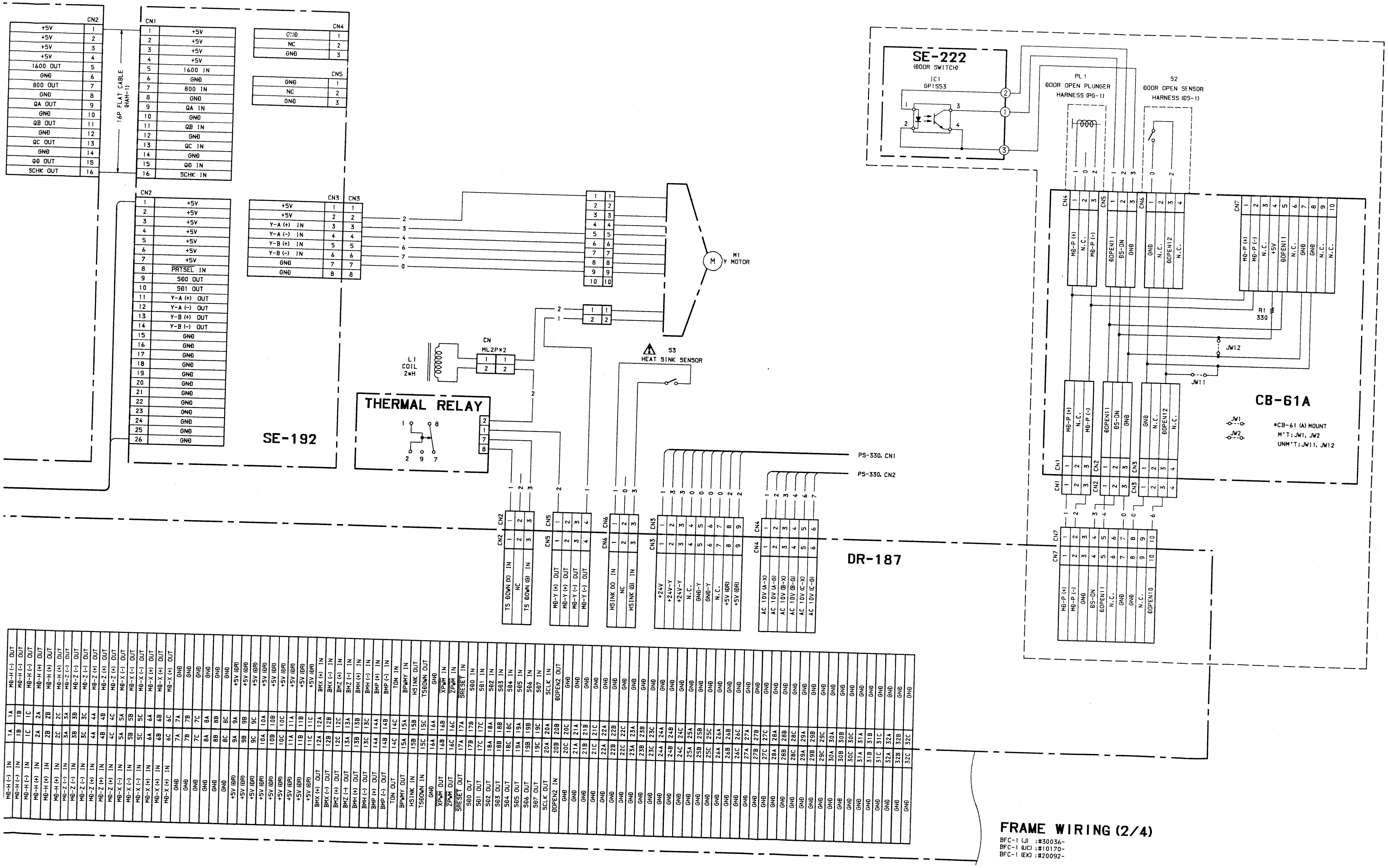
**CB-61 BOARD** ; Connector For Door
**SE-222 BOARD** ; Door Switch

J ; S/N 30036 and higher
UC ; S/N 10170 and higher
EK ; S/N 20092 and higher


BKFC-8D
SE-201
FOR Đ-1 AND Đ-2 SERIES
SE-200
FOR Đ-1 AND Đ-2 SERIES
20P FLAT CABLE
BKFC-10B/10S
SE-199A
FOR BETACAM SERIES
SE-199B
FOR S-VHS SERIES
SE-198
FOR BETACAM AND S-VHS SERIES
CN1
CN2
CN11
CN17
CN18
CN20
+5V
A01 IN
A02 IN
A03 IN
A04 IN
A05 IN
QA OUT
QB OUT
QC OUT
CLK OUT
SCHK1 OUT
SCHK2 OUT
SCHK3 OUT
SCHK4 OUT
GND
A01 OUT
A02 OUT
A03 OUT
A04 OUT
A05 OUT
QA IN
QB IN
QC IN
CLK IN
SCHK1 IN
SCHK2 IN
SCHK3 IN
SCHK4 IN
SRESET IN
SBIN IN
SR/W IN
SWDS IN
SA1 IN
SA2 IN
SA3 IN
SA4 IN
SD0 I/O
SD1 I/O
SD2 I/O
SD3 I/O
SD4 I/O
SD5 I/O
SD6 I/O
SD7 I/O
SRESET OUT
SBIN OUT
SR/W OUT
SWDS OUT
SA1 OUT
SA2 OUT
SA4 OUT
SD0 I/O
1600 OUT
800 OUT
QD OUT
SCHK OUT
16P FLAT CABLE (HAH-1)
SE-193
40PIN FLAT CABLE (BIN-8)
26PIN FLAT CABLE (HAH-2)
FRTSEL OUT
SBO IN
SDI IN
Y-A (+) IN
Y-A (-) IN
Y-B (+) IN
Y-B (-) IN
MD-H (-) OUT
MD-H (+) OUT
MD-Z (-) OUT
MD-Z (+) OUT
MD-X (-) OUT
MD-H (-) IN
MD-H (+) IN
MD-Z (-) IN
MD-Z (+) IN
MD-X (-) IN
MB-431

注意1: ⚠印のついた部品は安全性を維持するために重要な部品です。従って交換する時は必ず指定の部品を使って下さい。

NOTE:
The ⚠-marked components are critical to sefety.
Replace only with same components as specified.


SE-192
CN1
CN2
CN3
CN4
CN5
16P FLAT CABLE (HAN-1)
+5V
1600 OUT
GND
800 OUT
QA OUT
QB OUT
QC OUT
QD OUT
SCHK OUT
1600 IN
800 IN
QA IN
QB IN
QC IN
QD IN
SCHK IN
NC
PRTSEL IN
S00 OUT
S01 OUT
Y-A (+) OUT
Y-A (-) OUT
Y-B (+) OUT
Y-B (-) OUT
Y-A (+) IN
Y-A (-) IN
Y-B (+) IN
Y-B (-) IN
M1
Y MOTOR
L1
COIL
2mH
CN
ML2P×2
THERMAL RELAY
S3
HEAT SINK SENSOR
PS-330, CN1
PS-330, CN2
DR-187
TS 6DWN 00 IN
TS 6DWN (0) IN
MB-Y (+) OUT
MB-Y (-) OUT
HSINK 00 IN
HSINK (0) IN
+24V
+24V-Y
GND-Y
N.C.
+5V (DR)
AC 10V (A-X)
AC 10V (A-0)
AC 10V (B-X)
AC 10V (B-0)
AC 10V (C-X)
AC 10V (C-0)
SE-222
(DOOR SWITCH)
IC1
GP1S53
PL1
DOOR OPEN PLUNGER
HARNESS (PG-1)
S2
DOOR OPEN SENSOR
HARNESS (DS-1)
CB-61A
CN1
CN2
CN3
CN4
CN5
CN6
CN7
MD-P (+)
MD-P (-)
N.C.
DOPEN11
DS-ON
DOPEN12
DOPEN10
R1
330
JW1
JW2
JW11
JW12
*CB-61 (A) MOUNT
M'T: JW1, JW2
UNM'T: JW11, JW12
MD-H (-) OUT
MD-H (+) OUT
MD-Z (-) OUT
MD-Z (+) OUT
MD-X (-) OUT
MD-X (+) OUT
MD-H (-) IN
MD-H (+) IN
MD-Z (-) IN
MD-Z (+) IN
MD-X (-) IN
MD-X (+) IN
BHX (+) OUT
BHX (-) OUT
BHZ (+) OUT
BHZ (-) OUT
BHH (+) OUT
BHP (+) OUT
BHP (-) OUT
TON OUT
BPWMY OUT
HSINK OUT
TSDOWN OUT
XPWM OUT
ZPWM OUT
SRESET OUT
S00 OUT
S01 OUT
S02 OUT
S03 OUT
S04 OUT
S05 OUT
S06 OUT
S07 OUT
SCLK OUT
DOPEN2 OUT
1A–32C

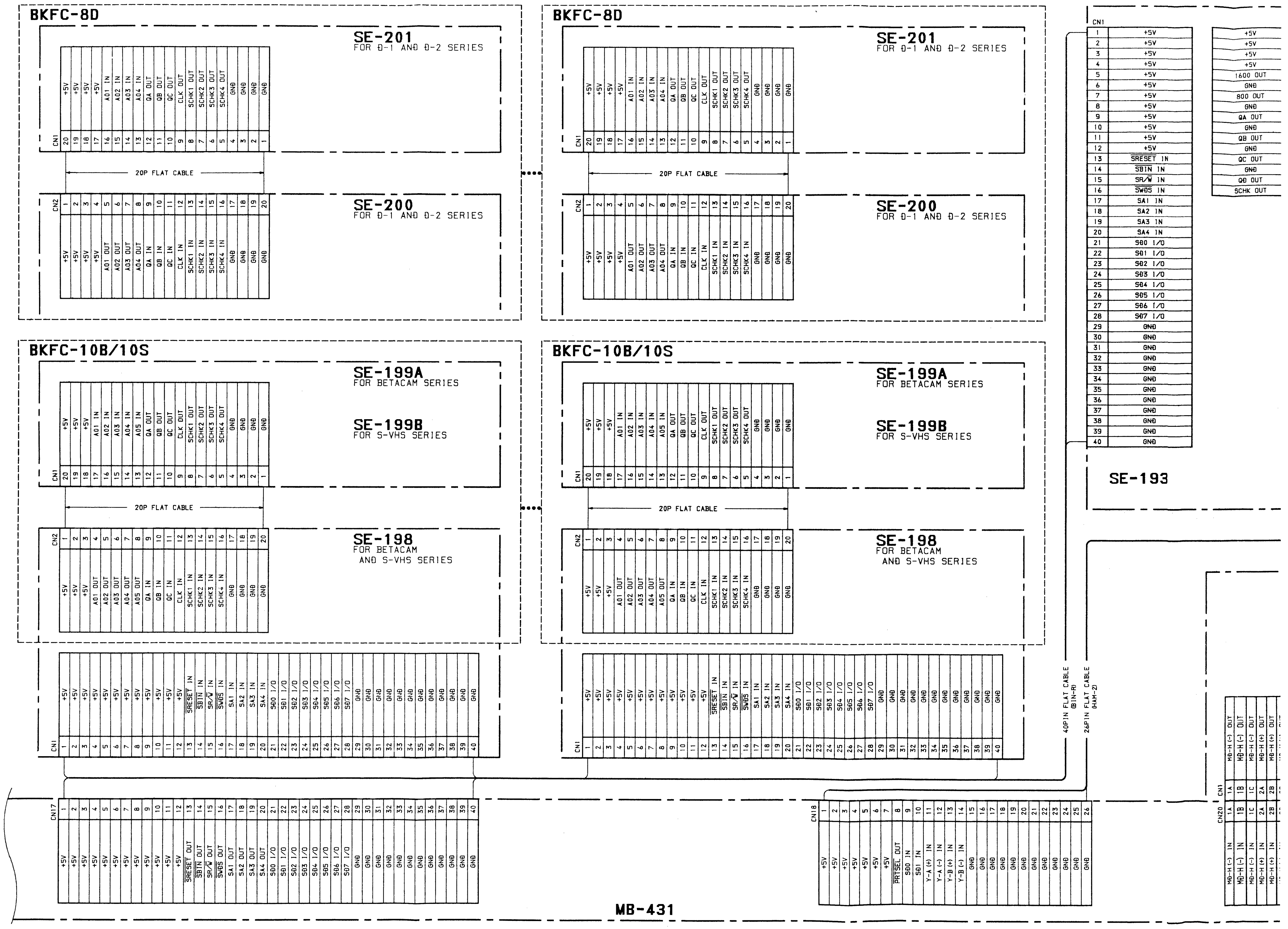
## FRAME WIRING (2/4)

BFC-1 (J) :#30036-
BFC-1 (UC) :#10170-
BFC-1 (EK) :#20092-

# FRAME WIRING (2/4)

**CB-50 BOARD** ; Y Motor Harness Connection
**CB-61 BOARD** ; Connector For Door
**SE-222 BOARD**; Door Switch

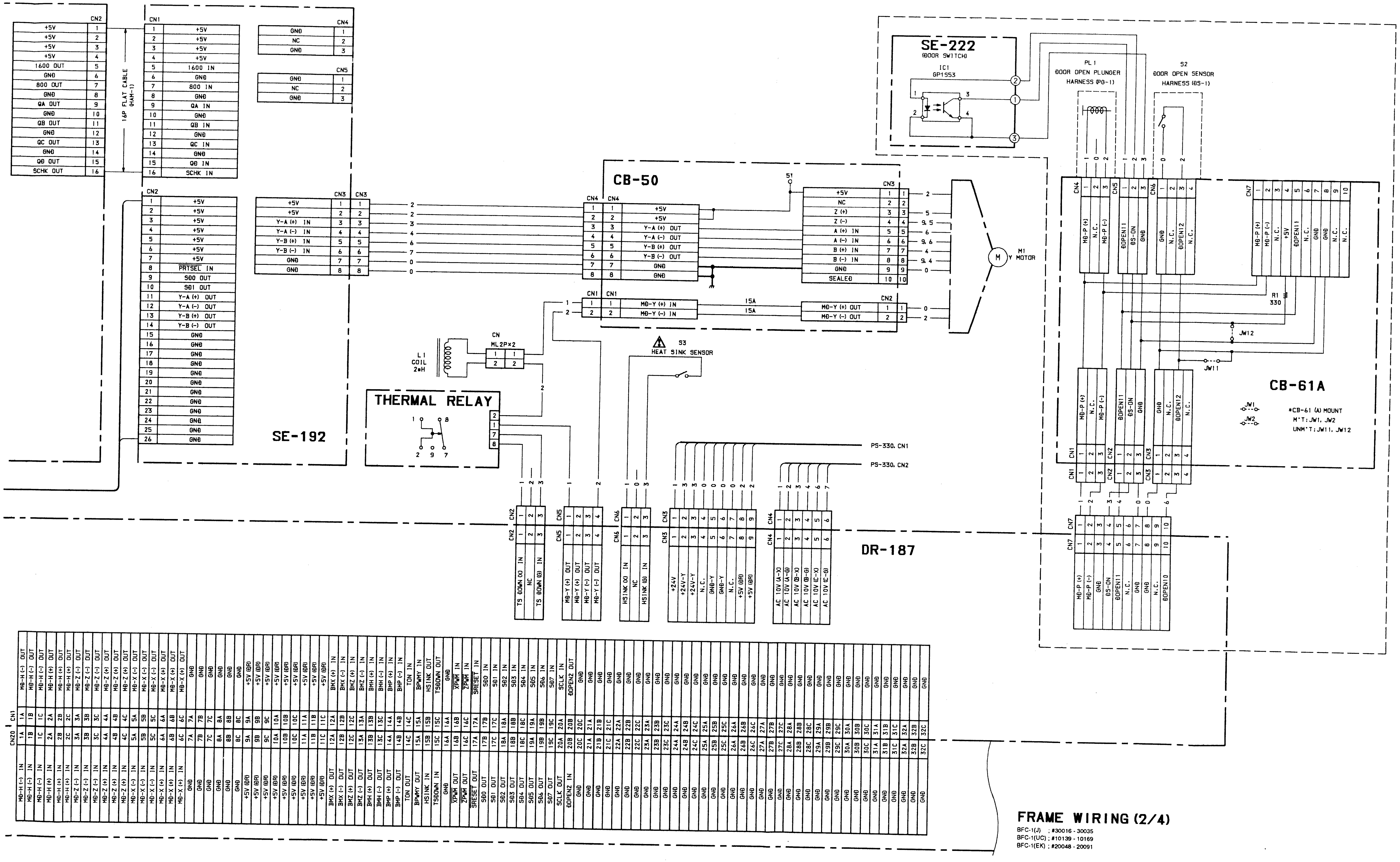
J ; S/N 30016 thru 30035
UC ; S/N 10139 thru 10169
EK ; S/N 20048 thru 20091


BKFC-8D
SE-201
FOR D-1 AND D-2 SERIES
20P FLAT CABLE
SE-200
FOR D-1 AND D-2 SERIES
BKFC-10B/10S
SE-199A
FOR BETACAM SERIES
SE-199B
FOR S-VHS SERIES
SE-198
FOR BETACAM
AND S-VHS SERIES
CN1
CN2
CN17
CN18
CN20
+5V
GND
A01 IN
A02 IN
A03 IN
A04 IN
A05 IN
QA OUT
QB OUT
QC OUT
CLK OUT
SCHK1 OUT
SCHK2 OUT
SCHK3 OUT
SCHK4 OUT
A01 OUT
A02 OUT
A03 OUT
A04 OUT
A05 OUT
QA IN
QB IN
QC IN
CLK IN
SCHK1 IN
SCHK2 IN
SCHK3 IN
SCHK4 IN
SRESET IN
SBIN IN
SR/W IN
SWDS IN
SA1 IN
SA2 IN
SA3 IN
SA4 IN
SD0 I/O
SD1 I/O
SD2 I/O
SD3 I/O
SD4 I/O
SD5 I/O
SD6 I/O
SD7 I/O
SRESET OUT
SBIN OUT
SR/W OUT
SWDS OUT
SA1 OUT
SA2 OUT
SA3 OUT
SA4 OUT
PRTSEL OUT
SD0 IN
SD1 IN
Y-A (+) IN
Y-A (-) IN
Y-B (+) IN
Y-B (-) IN
1600 OUT
800 OUT
QA OUT
QB OUT
QC OUT
QD OUT
SCHK OUT
SE-193
40PIN FLAT CABLE (BIN-R)
26PIN FLAT CABLE (HAM-2)
MD-H (-) OUT
MD-H (+) OUT
MD-H (-) IN
MD-H (+) IN
MB-431

注意1: ⚠印のついた部品は安全性を維持するために重要な部品です。従って交換する時は必ず指定の部品を使って下さい。

NOTE:
The ⚠-marked components are critical to sefety.
Replace only with same components as specified.

FRAME WIRING (2/4) CB-50, CB-61 SE-222


CN2
+5V
1600 OUT
800 OUT
QA OUT
QB OUT
QC OUT
QD OUT
SCHK OUT
GND
16P FLAT CABLE (HAM-1)
CN1
1600 IN
800 IN
QA IN
QB IN
QC IN
QD IN
SCHK IN
CN4
CN5
GND
NC
PRTSEL IN
SDD OUT
SD1 OUT
Y-A (+) OUT
Y-A (-) OUT
Y-B (+) OUT
Y-B (-) OUT
SE-192
CN3
Y-A (+) IN
Y-A (-) IN
Y-B (+) IN
Y-B (-) IN
CB-50
S1
Z (+)
Z (-)
A (+) IN
A (-) IN
B (+) IN
B (-) IN
SEALED
M1
Y MOTOR
MD-Y (+) IN
MD-Y (-) IN
15A
MD-Y (+) OUT
MD-Y (-) OUT
L1
COIL
2mH
CN
ML2P×2
THERMAL RELAY
S3
HEAT SINK SENSOR
PS-330, CN1
PS-330, CN2
SE-222
(DOOR SWITCH)
IC1
GP1S53
PL1
DOOR OPEN PLUNGER
HARNESS (PG-1)
S2
DOOR OPEN SENSOR
HARNESS (DS-1)
MD-P (+)
MD-P (-)
N.C.
DOPEN11
DS-ON
DOPEN12
R1
330
JW12
JW11
CB-61A
JW1
JW2
*CB-61 (A) MOUNT
M'T: JW1, JW2
UNM'T: JW11, JW12
DR-187
CN2
TS DOWN (X) IN
TS DOWN (Y) IN
CN5
MD-Y (+) OUT
MD-Y (-) OUT
CN6
HSINK (X) IN
HSINK (Y) IN
+24V
+24V-Y
GND-Y
+5V (DR)
AC 10V (A-X)
AC 10V (A-Y)
AC 10V (B-X)
AC 10V (B-Y)
AC 10V (C-X)
AC 10V (C-Y)
CN7
DOPEN10
CN1
CN20
MD-H (-) OUT
MD-H (+) OUT
MD-Z (-) OUT
MD-Z (+) OUT
MD-X (-) OUT
MD-X (+) OUT
BHX (+) IN
BHX (-) IN
BHZ (+) IN
BHZ (-) IN
BHH (+) IN
BHH (-) IN
BHP (+) IN
BHP (-) IN
TON IN
BPWMY IN
HSINK OUT
TSDOWN OUT
XPWM IN
ZPWM IN
SRESET IN
SD0 IN
SD1 IN
SD2 IN
SD3 IN
SD4 IN
SD5 IN
SD6 IN
SD7 IN
SCLK IN
DOPEN2 OUT
MD-H (-) IN
MD-H (+) IN
MD-Z (-) IN
MD-Z (+) IN
MD-X (-) IN
MD-X (+) IN
BHX (+) OUT
BHX (-) OUT
BHZ (+) OUT
BHZ (-) OUT
BHH (+) OUT
BHH (-) OUT
BHP (+) OUT
BHP (-) OUT
TON OUT
BPWMY OUT
HSINK IN
TSDOWN IN
XPWM OUT
ZPWM OUT
SRESET OUT
SD0 OUT
SD1 OUT
SD2 OUT
SD3 OUT
SD4 OUT
SD5 OUT
SD6 OUT
SD7 OUT
SCLK OUT
DOPEN2 IN

**FRAME WIRING (2/4)**

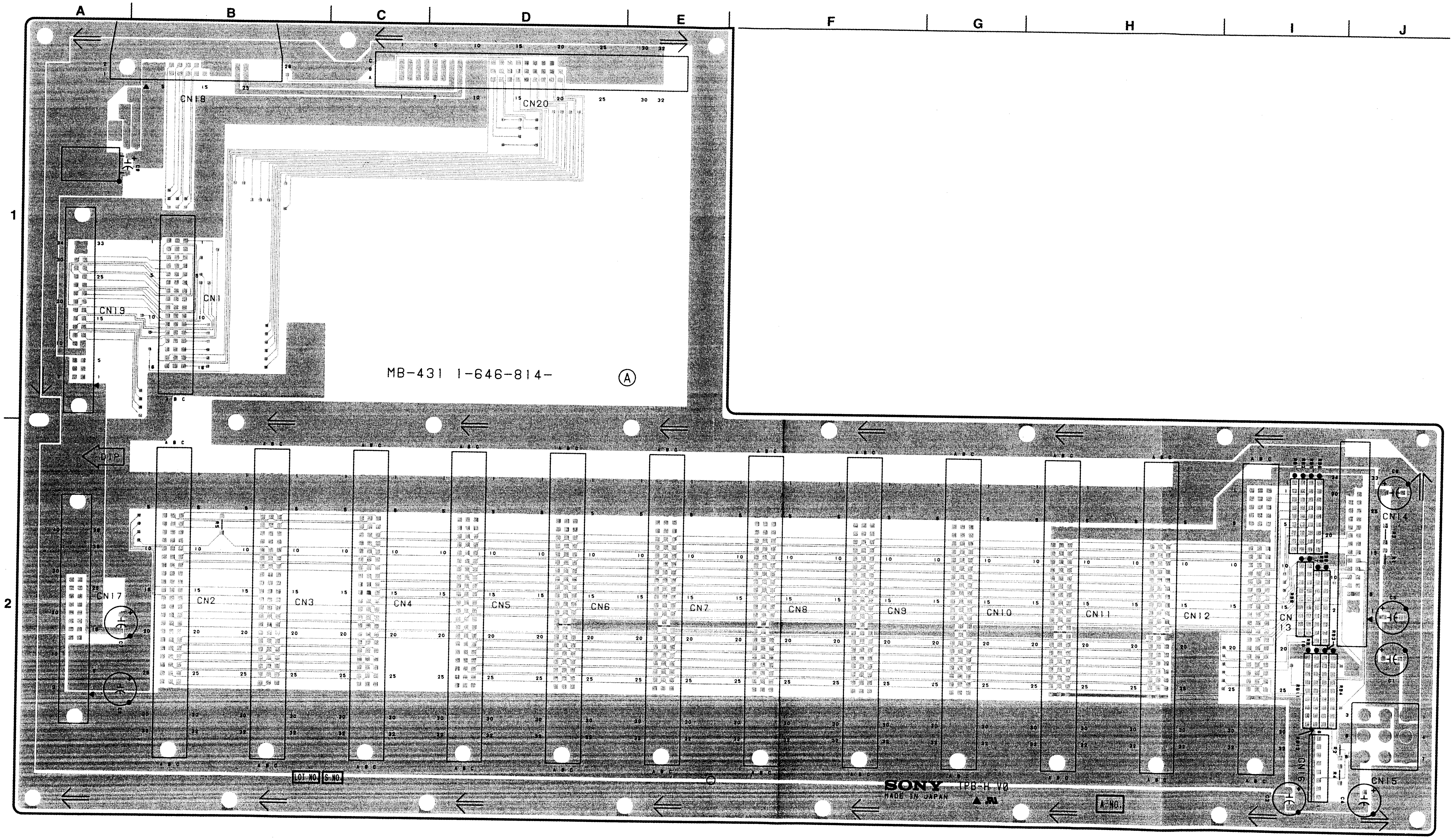
BFC-1(J) ; #30016 - 30035
BFC-1(UC) ; #10139 - 10169
BFC-1(EK) ; #20048 - 20091

13 - 68 (b)

## **MB-431** BOARD (1-646-814-12, 13)

A Side

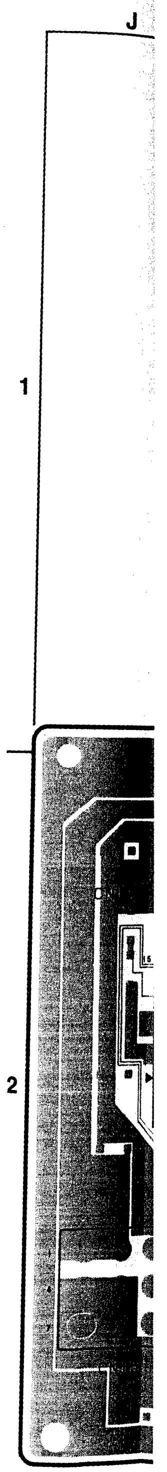
**J ; S/N 30016 and higher**
**UC ; S/N 10119 and higher**
**EK ; S/N 20038 and higher**



A
B
C
D
E
F
G
H
I
J
1
2
CN18
CN20
CN19
CN1
MB-431 1-646-814-
Ⓐ
DTP
CN17
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
CN12
CN13
CN14
CN15
CN16
LOT NO.
S.NO.
SONY
MADE IN JAPAN
TPB-H V0
A-NO.

**MB-431** -A SIDE-
1-646-814-12, 13
BFC-1

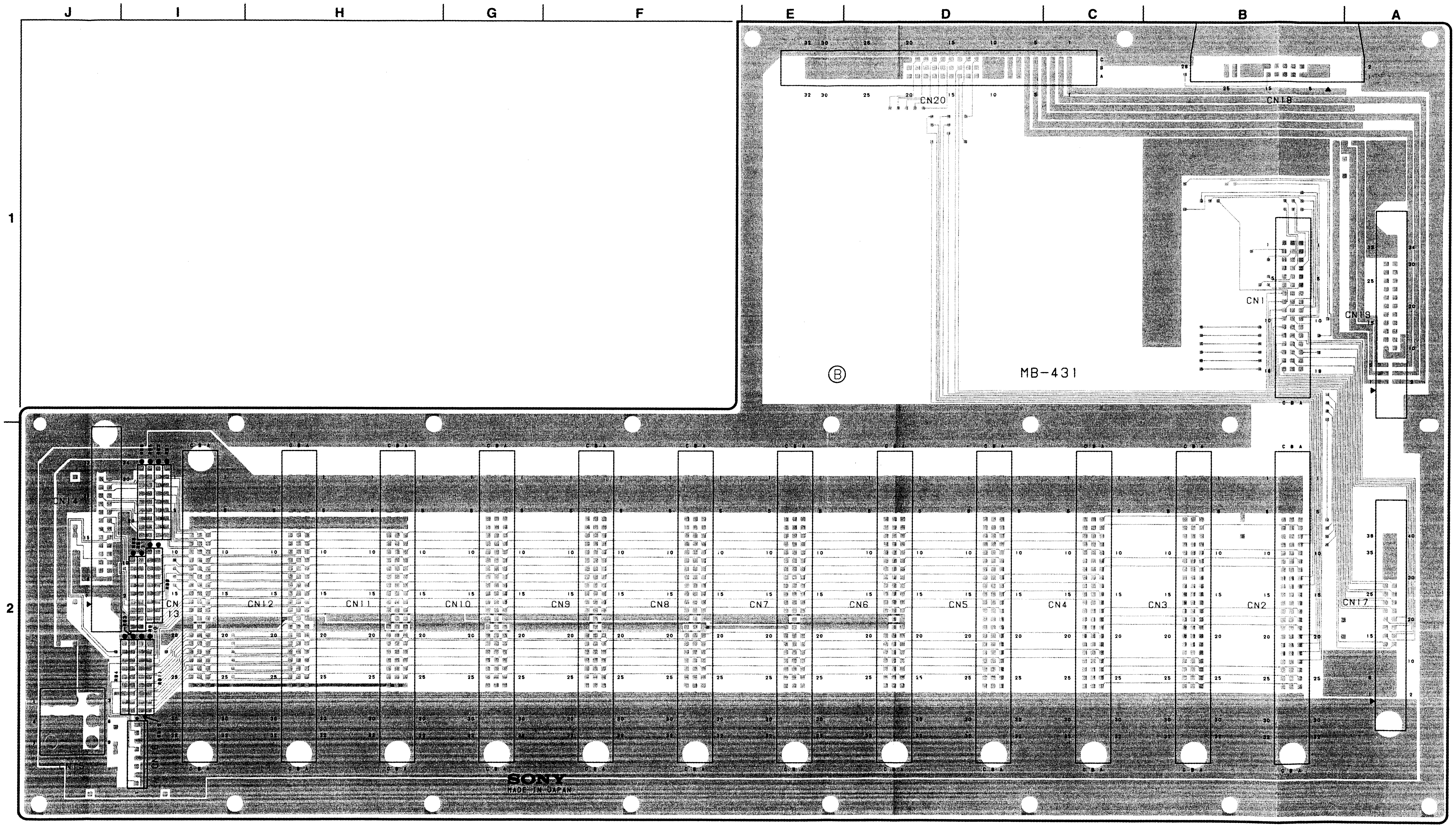
**MB-431** BO
B Side



## **MB-431** BOARD (1-646-814-12, 13)

B Side

| | |
|---|---|
| J | ; S/N 30016 and higher |
| UC | ; S/N 10119 and higher |
| EK | ; S/N 20038 and higher |


J
I
H
G
F
E
D
C
B
A
1
2
CN20
CN18
CN1
CN19
CN17
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
CN12
CN13
CN14
MB-431
Ⓑ
SONY
MADE IN JAPAN

**MB-431** -B SIDE-

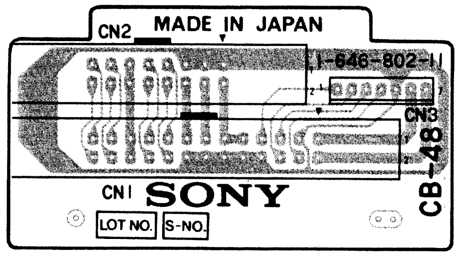
**BFC-1**

**MB-431 (1-646-814-12, 13)**

| | |
|---|---|
| CN1 | B-1 |
| CN2 | B-2 |
| CN3 | B-2 |
| CN4 | C-2 |
| CN5 | D-2 |
| CN6 | D-2 |
| CN7 | E-2 |
| CN8 | F-2 |
| CN9 | F-2 |
| CN10 | G-2 |
| CN11 | H-2 |
| CN12 | H-2 |
| CN13 | I-2 |
| CN14 | J-2 |
| CN15 | J-2 |
| CN16 | I-2 |
| CN17 | A-2 |
| CN18 | B-1 |
| CN19 | A-1 |
| CN20 | D-1 |
| | |
| RB1 | I-2 |
| RB2 | I-2 |
| RB3 | I-2 |
| RB4 | J-2 |
| RB5 | I-2 |
| RB6 | I-2 |
| RB7 | I-2 |
| RB8 | I-2 |
| RB9 | I-2 |
| RB10 | I-2 |
| RB11 | I-2 |
| RB12 | I-2 |

## CB-48 BOARD (1-646-802-11)

Component Side

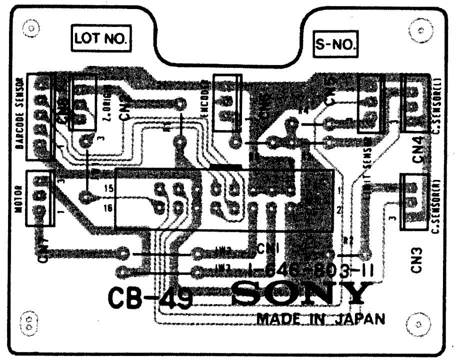

CN2
MADE IN JAPAN
1-646-802-11
CN3
CB-48
CN1
SONY
LOT NO.
S-NO.

**CB-48** -COMPONENT SIDE-
1-646-802-11
BFC-1

## CB-49 BOARD (1-646-803-11)

Component Side

J ; S/N 30001 thru 30002
UC ; S/N 10001 thru 10015
EK ; S/N 20001 thru 20006

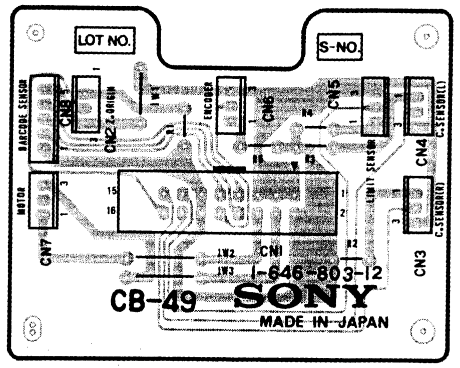

LOT NO.
S-NO.
BARCODE SENSOR
MOTOR
CN4
CN3
CN1
1-646-803-11
CB-49
SONY
MADE IN JAPAN

**CB-49** -COMPONENT SIDE-
1-646-803-11
BFC-1

## CB-49 BOARD (1-646-803-12)

Component Side

J ; S/N 30003 and higher
UC ; S/N 10016 and higher
EK ; S/N 20007 and higher

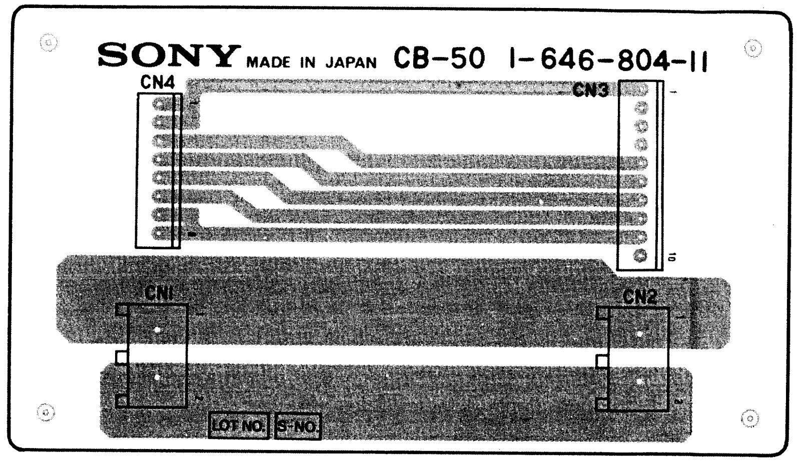

LOT NO.
S-NO.
BARCODE SENSOR
MOTOR
ENCODER
CN5
CN4
CN3
CN1
1-646-803-12
CB-49
SONY
MADE IN JAPAN

**CB-49** -COMPONENT SIDE-
1-646-803-12
BFC-1

## CB-50 BOARD (1-646-804-11)

Component Side

J ; S/N 30001 thru 30035
UC ; S/N 10001 thru 10169
EK ; S/N 20001 thru 20091

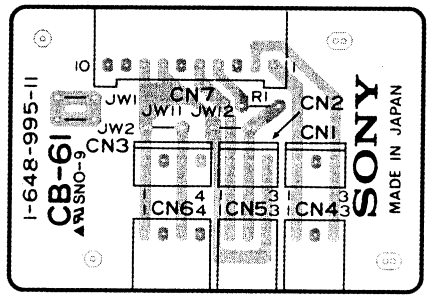

SONY MADE IN JAPAN CB-50 1-646-804-11
CN4
CN3
CN1
CN2
LOT NO.
S-NO.

**CB-50** -COMPONENT SIDE-
1-646-804-11
BFC-1

## CB-61 BOARD (1-648-995-11)

Component Side

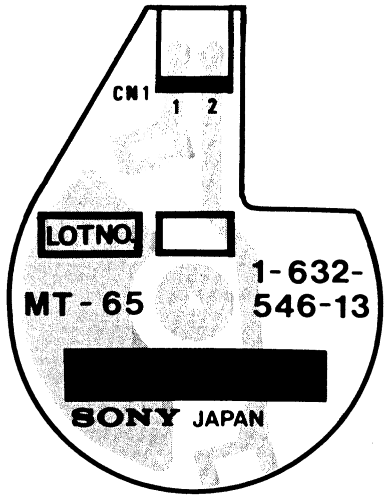
J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher


1-648-995-11
CB-61
S-NO.
JW1
CN7
JW11
JW12
R1
CN2
CN1
JW2
CN3
CN6
CN5
CN4
SONY
MADE IN JAPAN

**CB-61** -COMPONENT SIDE-
1-648-995-11
BFC-1

## MT-65 BOARD (1-632-546-13)

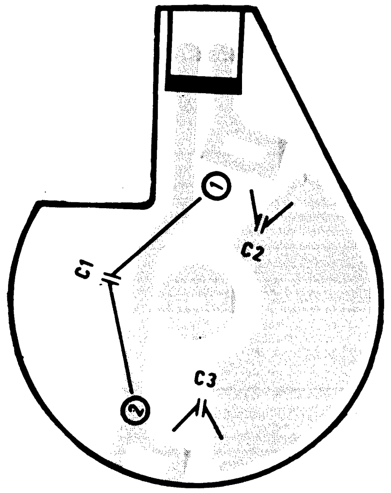
Component Side


CN1
1 2
LOT NO.
MT-65
1-632-546-13
SONY JAPAN

**MT-65** -COMPONENT SIDE-
1-632-546-13
BFC-1

## MT-65 BOARD (1-632-546-13)

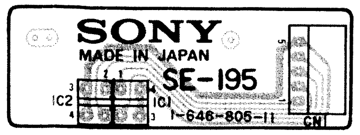
Soldering Side



**MT-65** -SOLDERING SIDE-
1-632-546-13
BFC-1

## SE-195 BOARD (1-646-805-11)

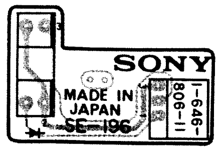
Component Side


SONY
MADE IN JAPAN
SE-195
IC2
IC1
1-646-805-11
CN1

**SE-195**
-COMPONENT SIDE-
1-646-805-11
BFC-1

## SE-196 BOARD (1-646-806-11)

Component Side

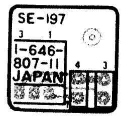

SONY
MADE IN JAPAN
SE-196
1-646-806-11

**SE-196**
-COMPONENT SIDE-
1-646-806-11
BFC-1

## SE-197 BOARD (1-646-807-11)

Component Side

J ; S/N 30001 thru 30015
UC ; S/N 10001 thru 10138
EK ; S/N 20001 thru 20047

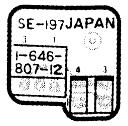

SE-197
1-646-807-11
JAPAN

**SE-197**
-COMPONENT SIDE-
1-646-807-11
BFC-1

## SE-197 BOARD (1-646-807-12)

Component Side

J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher

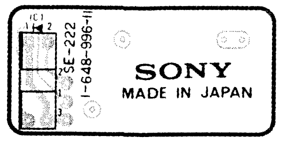

SE-197JAPAN
1-646-807-12

**SE-197**
-COMPONENT SIDE-
1-646-807-12
BFC-1

## SE-222 BOARD (1-648-996-11

Component Side

J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher

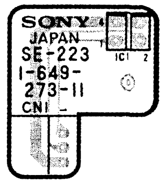

SE-222
1-648-996-11
SONY
MADE IN JAPAN

**SE-222**
-COMPONENT SIDE-
1-648-996-11
BFC-1

## SE-223 BOARD (1-649-273-11

Component Side

J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher

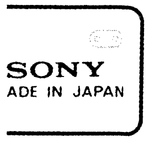

SONY
JAPAN
SE-223
IC1
1-649-273-11
CN1

**SE-223**
-COMPONENT SIDE-
1-649-273-11
BFC-1

FRAME WIRING CB-48, CB-49, CB-50, CB-61, MT-65
SE-195, SE-196, SE-197, SE-222, SE-223, VS-49

**OARD (1-648-996-11)**
Side

016 and higher
139 and higher
048 and higher


SONY
ADE IN JAPAN

**2**
**NT SIDE–**

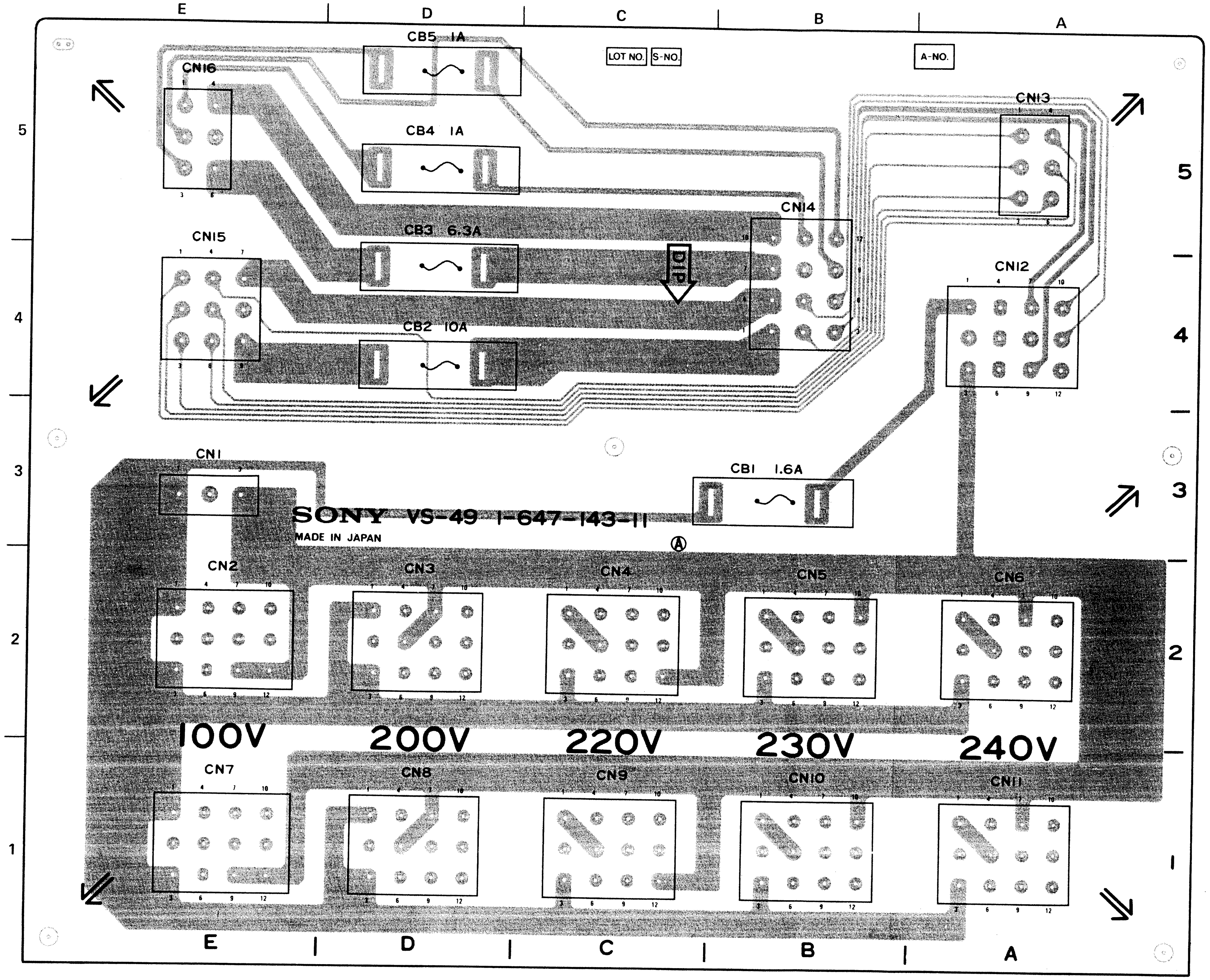
**OARD (1-649-273-11)**
ide

16 and higher
39 and higher
48 and higher

**3**
**T SIDE–**

## VS-49 BOARD (1-647-143-11)

A Side


E
D
C
B
A
5
4
3
2
1
CB5 1A
CB4 1A
CB3 6.3A
CB2 10A
CB1 1.6A
LOT NO.
S-NO.
A-NO.
CN16
CN15
CN14
CN13
CN12
CN1
CN2
CN3
CN4
CN5
CN6
CN7
CN8
CN9
CN10
CN11
DIP
SONY VS-49 1-647-143-11
MADE IN JAPAN
100V
200V
220V
230V
240V

**VS-49 –A SIDE–**
**1-647-143-11**
**BFC-1**

**BFC-1**

**VS-49 (1-647-143-11)**

| | |
|---|---|
| CB1 | B-3 |
| CB2 | D-4 |
| CB3 | D-5 |
| CB4 | D-5 |
| CB5 | D-5 |
| CN1 | E-3 |
| CN2 | E-2 |
| CN3 | D-2 |
| CN4 | C-2 |
| CN5 | B-2 |
| CN6 | A-2 |
| CN7 | E-1 |
| CN8 | D-1 |
| CN9 | C-1 |
| CN10 | B-1 |
| CN11 | A-1 |
| CN12 | A-4 |
| CN13 | A-5 |
| CN14 | B-5 |
| CN15 | E-5 |
| CN16 | E-5 |

# SECTION 16
# SPARE PARTS AND OPTIONAL FIXTURE

## 16-1. NOTES ON REPAIR PARTS

### (1) Safety Related Components Warning

Components marked with ⚠ on the schematic diagrams, exploded views and electrical spare parts list are critical to safe operation.
Replace these components with Sony parts whose part numbers appear in this manual or in service bulletins and service manual supplements published by Sony.

### (2) Standardization of Parts

Repair parts supplied from Sony Parts Center may not be always identical with the parts which actually in use due to "accommodating the improved parts and/or engineering changes" or "standarzation of genuine parts".
This manual's exploded views and electrical spare parts list are indicating the part numbers of "the standardized genuine parts at present".

### (3) Stock of Parts

Parts marked with "o" SP (Supply Code) column of the spare parts list are not normally required for routine service work. Orders for parts marked with "o" will be processed, but allow for additional delivery time.

### (4) Units for Capacitors, Inductors and Resistors

The following units are assumed in schematic diagrams, electrical parts list and exploded views unless otherwise specified.

Capacitors : µF
Inductors : µH
Resistors : Ω

### (5) Change of Parts

Regarding engineering parts changes, refer to Section 17. "CHANGED PARTS".

## 補修用部品注意事項

### (1) 安全重要部品

回路図、分解図、電気部品表中、⚠印の部品は安全性を維持するために重要な部品です。従ってこれらの部品を交換するときには必ず指定の部品と交換して下さい。

### (2) 部品の共通化

ソニーから供給される部品はセットに実装されているものと異なることがあります。これは部品の共通化、改良等によるものです。
分解図や電気部品表には現時点での共通化された部品が記載されています。

### (3) 部品の在庫

部品表のSP (Supply code) 欄にoで示される部品は交換頻度が低い部品ですので在庫していないことがあり、納期が長くなることがあります。

### (4) コンデンサ、インダクタ、抵抗の単位

回路図、分解図、電気部品表中、特に明記したものを除き、下記の単位は省略されています。

コンデンサ :µF
インダクタ :µH
抵抗 :Ω

### (5) 部品の変更

部品の変更に関する情報は第17章「CHANGED PARTS」を参照して下さい。

## 16-2. EXPLODED VIEW

- Exploded views are composed of the following blocks

Page
(1) FRAME BLOCK........................................16-2
(2) CONTROLLER BLOCK..............................16-4
(3) POWER BOX BLOCK...............................16-6
(4) ELEVATOR HAND BLOCK.......................16-8
(5) ELEVATOR X/Z STAGE BLOCK..............16-10
(6) ELEVATOR Y DRIVING BLOCK...............16-12
(7) BIN UNIT..................................................16-14
(8) RACK MOUNT KIT....................................16-16

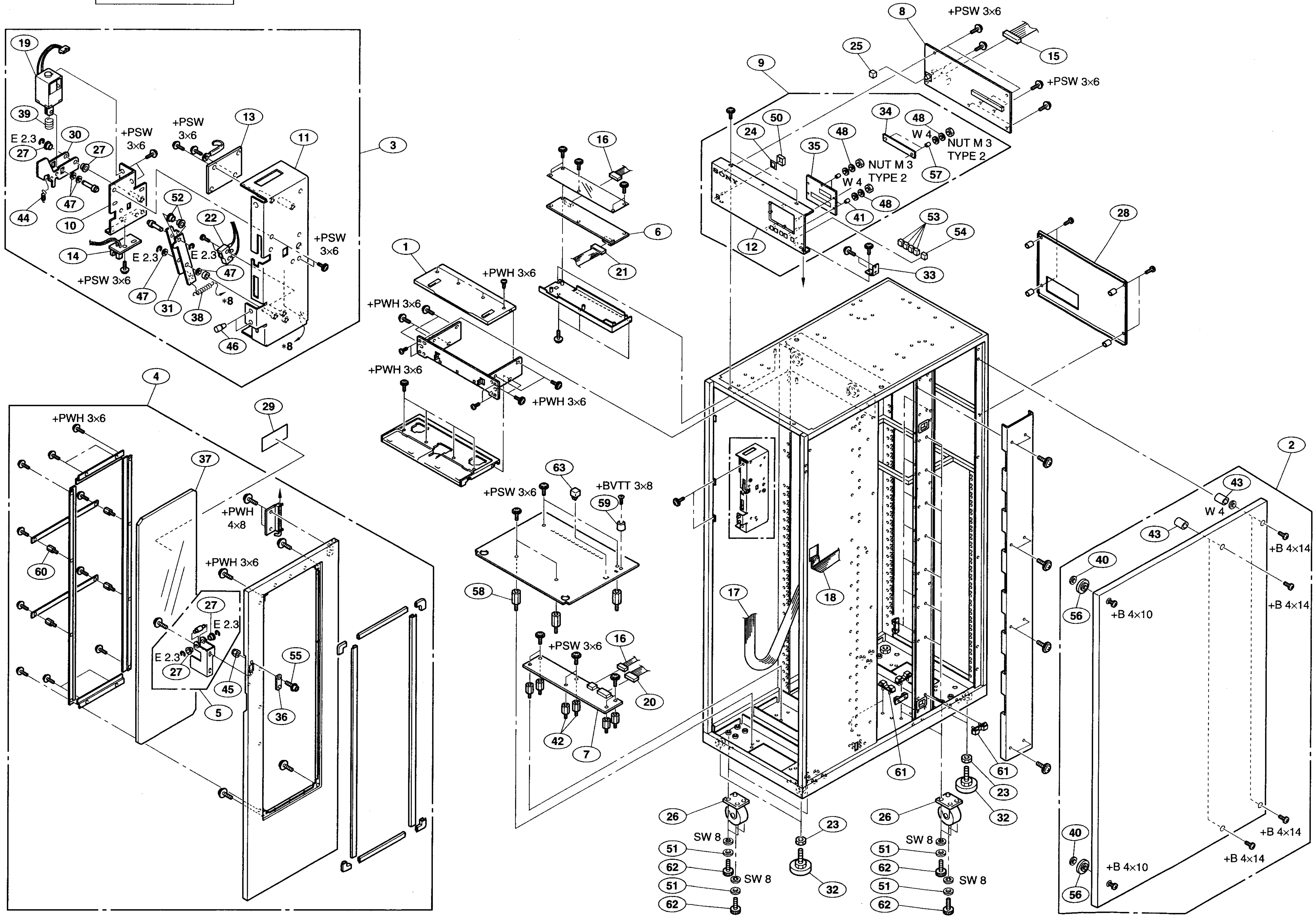
### FRAME BLOCK

J ; S/N 30036 and higher
UC ; S/N 10170 and higher
EK ; S/N 20092 and higher

| No. | Parts No. | SP | Description |
|---|---|---|---|
| 1 | A-8267-053-A | s | PLATE ASSY (B) , BIN |
| 2 | A-8267-645-A | o | PLATE, SIDE (R) ASSY, FRAME |
| 3 | A-8267-772-A | o | DOOR LOCK ASSY (SERVICE) |
| 4 | A-8267-786-A | o | DOOR ASSY, FLONT |
| 5 | A-8267-864-A | o | PLATE, LOCK ASSY |
| 6 | A-8271-763-A | o | MOUNTED CIRCUIT BOARD SE-192 |
| 7 | A-8271-764-A | o | MOUNTED CIRCUIT BOARD, SE-193 |
| 8 | A-8271-767-A | o | MOUNTED CIRCUIT BOARD, DP-178 |
| 9 | A-8271-849-C | o | SUB ASSY (F), DISPLAY PANEL |
| 10 | X-3167-304-1 | o | BRACKET ASSY, PLUNGER |
| 11 | X-3167-305-1 | o | BRACET ASSY, INTER LOCK |
| 12 | X-3167-520-1 | o | PANEL ASSY DISPLAY |
| 13 | 1-648-995-11 | o | PRINTED CIRCUIT BOARD, CB-61 |
| 14 | 1-648-996-11 | o | PRINTED CIRCUIT BOARD, SE-222 |
| 15 | 1-696-899-11 | s | CABLE, FLAT (DP-1) |
| 16 | 1-696-900-11 | s | CABLE, FLAT (HAM-1) |
| 17 | 1-696-901-12 | s | CABLE, FLAT (ELV-1) |
| 18 | 1-696-902-12 | s | CABLE, FLAT (ELV-0) |
| 19 | 1-951-169-21 | s | HARNESS (PG-1) |
| 20 | 1-951-282-13 | s | HARNESS (BIN-R) |
| 21 | 1-951-283-11 | s | HARNESS (HAM-2) |
| 22 | 1-952-389-11 | o | HARNESS (DS-2) |
| 23 | 2-354-072-01 | s | NUT (20), HEXAGON |
| 24 | 3-171-595-01 | o | SHEET, INDICATOR |
| 25 | 3-179-193-31 | o | KEY TOP (SQUARE 4) |
| 26 | 3-179-365-01 | o | CASTER |
| 27 | 3-179-470-01 | o | TOOL RETAINER |
| 28 | 3-179-477-04 | o | PANEL, VS |
| 29 | 3-179-542-02 | o | SEAL (FC) |
| 30 | 3-183-171-01 | o | PLATE, LOCK |
| 31 | 3-183-172-01 | o | LEVER, LOCK |
| 32 | 3-185-386-01 | o | ADJUSTOR |
| 33 | 3-185-396-01 | o | BRACKET (UPPER), FD RETAINER |
| 34 | 3-185-419-01 | o | PLATE |
| 35 | 3-185-420-01 | o | WINDOW, DISPLAY |
| 36 | 3-185-422-01 | o | COVER, LOCK |
| 37 | 3-185-427-01 | o | WINDOW, ORNAMENTAL |
| 38 | 3-556-464-00 | s | SPRING, TENSION |
| 39 | 3-650-523-00 | s | SPRING, COMPRESSION |
| 40 | 3-650-537-00 | o | WASHER |
| 41 | 3-654-058-00 | o | SPACER 3×3 |
| 42 | 3-664-223-00 | o | SUPPORT PC BOARD |
| 43 | 3-668-416-00 | o | SPACER, BRACKET, M4 |
| 44 | 3-669-979-00 | s | SPRING, TENSION |
| 45 | 3-680-316-00 | s | NUT (M4) STOPPER |
| 46 | 3-701-188-XX | s | FOOT, RUBBER |
| 47 | 3-701-439-21 | s | WASHER (W3) |
| 48 | 3-701-441-21 | s | WASHER |
| 49 | 3-701-542-02 | s | FOOT, RUBBER |
| 50 | 3-717-377-01 | o | FRAME (SQUARE), ORNAMENTAL |
| 51 | 3-723-795-01 | s | WASHER (W8) |
| 52 | 3-722-784-01 | s | ROLLER (A) GUIDE |
| 53 | 3-723-798-01 | s | KEY TOP (85U1) |
| 54 | 3-723-798-11 | s | KEY TOP (85U1) |
| 55 | 3-732-378-21 | s | BOLT (M4×12), HEXAGON SOCKET, F |
| 56 | 3-734-819-01 | s | BEARING, PLATEN |
| 57 | 3-738-602-01 | o | SPACER 3×6 |
| 58 | 3-897-313-01 | s | BOSS (17.2), RELAY |
| 59 | 2-092-326-01 | s | FOOT, RUBBER |
| 60 | 4-870-266-00 | o | SUPPORT, BLOCK |
| 61 | 4-874-187-01 | o | CLIP, CABLE |
| 62 | 7-683-380-07 | s | BOLT, HEXAGON 8×20 |
| 63 | X-4942-793-1 | s | RUBBER ASSY, FLOATING |

## FRAME BLOCK

J ; S/N 30036 and higher
UC ; S/N 10170 and higher
EK ; S/N 20092 and higher


19
39
E 2.3
27
30
27
+PSW 3x6
+PSW 3x6
13
11
3
47
44
10
52
22
+PSW 3x6
14
E 2.3
E 2.3
47
+PSW 3x6
47
31
38
*8
46
*8
8
+PSW 3x6
25
15
9
+PSW 3x6
34
48
50
24
48
W 4
NUT M 3 TYPE 2
35
NUT M 3 TYPE 2
57
W 4
48
41
12
53
54
33
28
16
6
21
1
+PWH 3x6
+PWH 3x6
+PWH 3x6
+PWH 3x6
4
+PWH 3x6
29
37
+PWH 4x8
+PWH 3x6
60
27
E 2.3
E 2.3
27
55
45
5
36
63
+PSW 3x6
+BVTT 3x8
59
58
+PSW 3x6
16
20
42
7
17
18
61
61
2
43
W 4
43
+B 4x14
40
56
+B 4x10
+B 4x14
23
32
26
SW 8
51
62
SW 8
51
62
23
32
26
SW 8
51
62
SW 8
51
62
40
56
+B 4x10
+B 4x14
+B 4x14

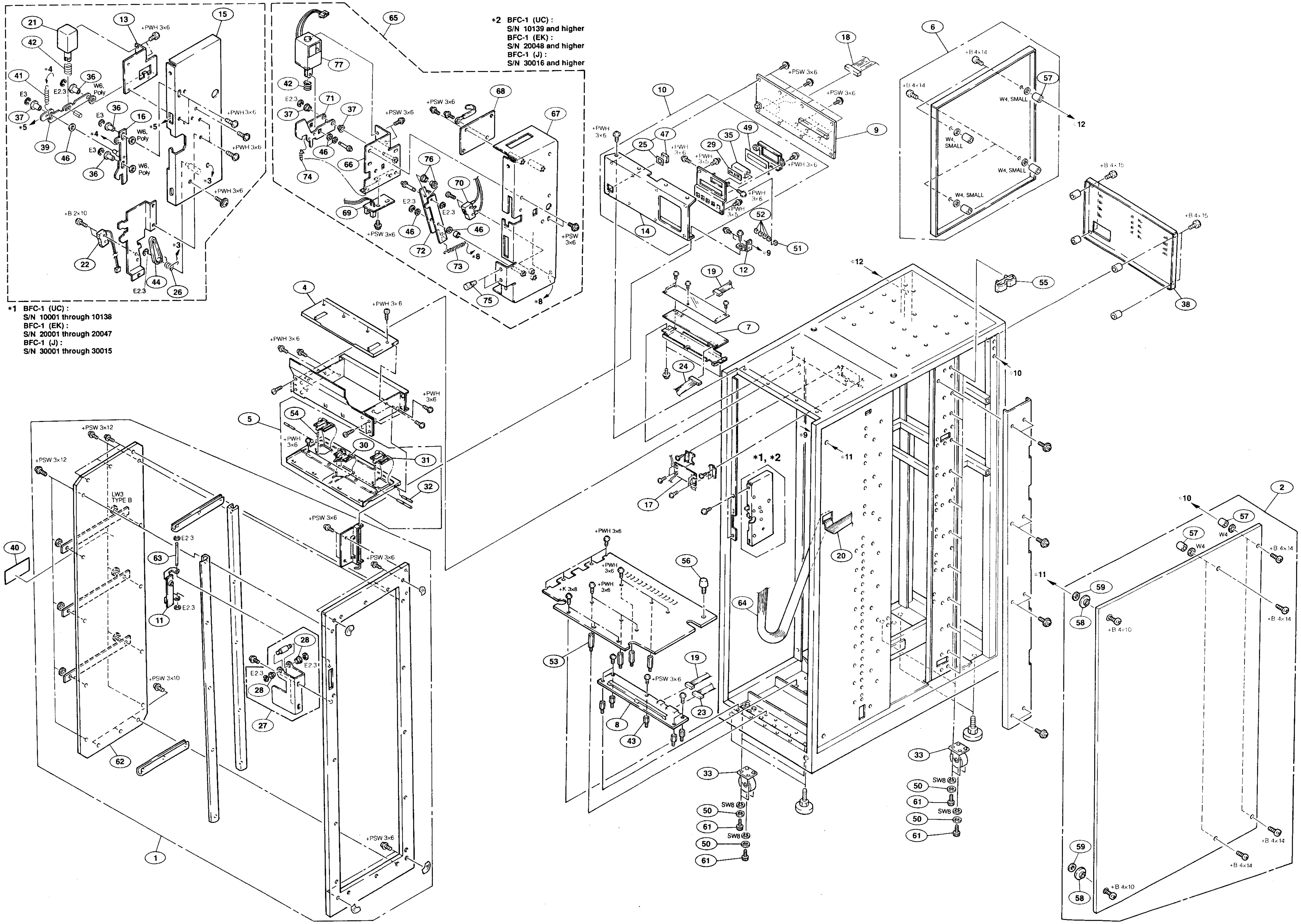
## FRAME BLOCK

J ; S/N 30001 through 30035
UC ; S/N 10001 through 10169
EK ; S/N 20001 through 20091

| No. | Parts No. | SP | Description |
|---|---|---|---|
| 1 | A-8267-786-A | o | DOOR ASSY, FRONT |
| 2 | A-8267-645-A | o | PLATE, SIDE (R) ASSY, FRAME |
| 4 | A-8267-053-A | s | PLATE ASSY (B), BIN |
| 5 | A-8267-055-A | s | PLATE ASSY (D), BIN |
| 6 | A-8267-144-B | o | PLATE, SIDE (L) ASSY, FRAME |
| 7 | A-8271-763-A | o | MOUNTED CIRCUIT BOARD, SE-192 |
| 8 | A-8271-764-A | o | MOUNTED CIRCUIT BOARD, SE-193 |
| 9 | A-8271-767-A | o | MOUNTED CIRCUIT BOARD, DP-178 |
| 10 | A-8271-849-A | o | SUB ASSY (F), DISPLEY PANEL |
| 11 | X-3166-975-1 | o | COVER ASSY, LOCK |
| 12 | X-3166-904-1 | o | RETAINER (UPPER) ASSY, FD |
| 13 | X-3166-918-1 | o | BRACKET (MH) ASSY |
| 14 | X-3166-947-3 | o | PANEL (B) ASSY, DISPLAY<br>For BFC-1:<br>S/N 10016 through 10169 (UC)<br>S/N 20007 through 20091 (EK)<br>S/N 30003 through 30035 (J) |
| 15 | X-3166-948-1 | o | PLATE (LH) ASSY, FITTING |
| 16 | X-3166-950-1 | o | PLATE (A) ASSY, LOCK |
| 17 | 1-646-804-11 | o | PRINTED CIRCUIT BOARD, CB-50 |
| 18 | 1-696-899-11 | s | CABLE, FLAT (DP-1) |
| 19 | 1-696-900-11 | s | CABLE, FLAT (HAM-1) |
| 20 | 1-696-902-12 | s | CABLE, FLAT (ELV-0) |
| 21 | 1-951-169-11 | s | HARNESS (PG-1) |
| 22 | 1-951-170-12 | s | HARNESS (DS-1) |
| 23 | 1-951-282-13 | s | HARNESS (BIN-R) |
| 24 | 1-951-283-11 | s | HARNESS (HAM-2) |
| 25 | 3-171-595-01 | o | SHEET, INDICATOR |
| 26 | 3-178-854-02 | s | SPRING, TORSION |
| 27 | A-8267-864-A | o | PLATE, LOCK ASSY |
| 28 | 3-179-470-01 | o | TOOL, RETAINER |
| 29 | 3-178-972-11 | o | PLATE |
| 30 | 3-178-978-02 | o | STOPPER (C) |
| 31 | 3-178-979-01 | o | STOPPER (S) |
| 32 | 3-178-980-01 | o | SHAFT (C), STOPPER |
| 33 | 3-179-365-01 | o | CASTER |
| 35 | 3-179-465-02 | o | PLATE, REFLECTION |
| 36 | 3-179-469-01 | o | TOOL RETAINER |
| 37 | 3-179-470-01 | o | TOOL RETAINER |
| 38 | 3-179-477-03 | o | PANEL, VS |
| 39 | 3-179-478-01 | o | ARM, G |
| 40 | 3-179-542-02 | o | SEAL (FC) |
| 41 | 3-472-221-00 | s | SPRING, TENSION |
| 42 | 3-650-523-00 | s | SPRING, COMPRESSION |
| 43 | 3-664-223-00 | o | SUPPORT PC BOARD |
| 44 | 3-668-205-02 | o | ARM, ROTARY |
| 46 | 3-701-439-21 | s | WASHER (W3) |
| 47 | 3-717-377-01 | o | FRAME (SQUARE 17), ORNAMENTAL |
| 49 | 3-723-746-01 | o | WINDOW, INDICATION |
| 50 | 3-723-795-01 | s | WASHER (W8) |
| 51 | 3-723-798-11 | s | KEY TOP (85U1) |
| 52 | 3-723-798-01 | s | KEY TOP (85U1) |
| 53 | 3-897-313-01 | s | BOSS (17.2), RELAY |
| 54 | 4-333-180-00 | s | SPRING |
| 55 | 4-874-187-01 | o | CLIP, CABLE |
| 56 | 4-002-730-00 | s | FOOT, REAR |
| 57 | 3-668-416-00 | o | SPACER, BRACKET, M4 |
| 58 | 3-734-819-01 | s | BEARING, PLATEN |
| 59 | 3-650-537-00 | o | WASHER |
| 61 | 7-683-380-07 | s | BOLT, HEXAGON 8×20 |
| 62 | 3-179-752-01 | o | WINDOW, ORNAMENTAL |
| 63 | 3-179-756-01 | o | SHAFT, LOCK |
| 64 | 1-696-901-12 | s | CABLE, FLAT (ELV-1) |
| 65 | A-8267-772-A | o | DOOR LOCK ASSY (SERVICE) |
| 66 | X-3167-304-1 | o | BRACKET ASSY, PLUNGER |
| 67 | X-3167-305-1 | o | BRACKET ASSY, INTER LOCK |
| 68 | 1-648-995-11 | o | PRINTED CIRCUIT BOARD, CB-61 |
| 69 | 1-648-996-11 | o | PRINTED CIRCUIT BOARD,SE-222 |
| 70 | 1-952-389-11 | o | HARNESS (DS-2) |
| 71 | 3-183-171-01 | o | PLATE, LOCK |
| 72 | 3-183-172-01 | o | LEVER, LOCK |
| 73 | 3-556-464-00 | s | SPRING, TENSION |
| 74 | 3-669-979-00 | s | SPRING, TENSION |
| 75 | 3-701-188-XX | s | FOOT, RUBBER |
| 76 | 3-722-784-01 | s | ROLLER (A) GUIDE |
| 77 | 1-951-169-21 | s | HARNESS (PG-1) |

## FRAME BLOCK

J ; S/N 30001 through 30035
UC ; S/N 10001 through 10169
EK ; S/N 20001 through 20091

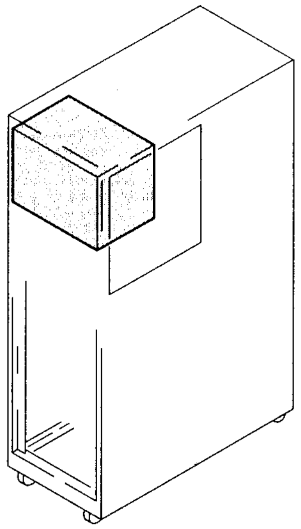


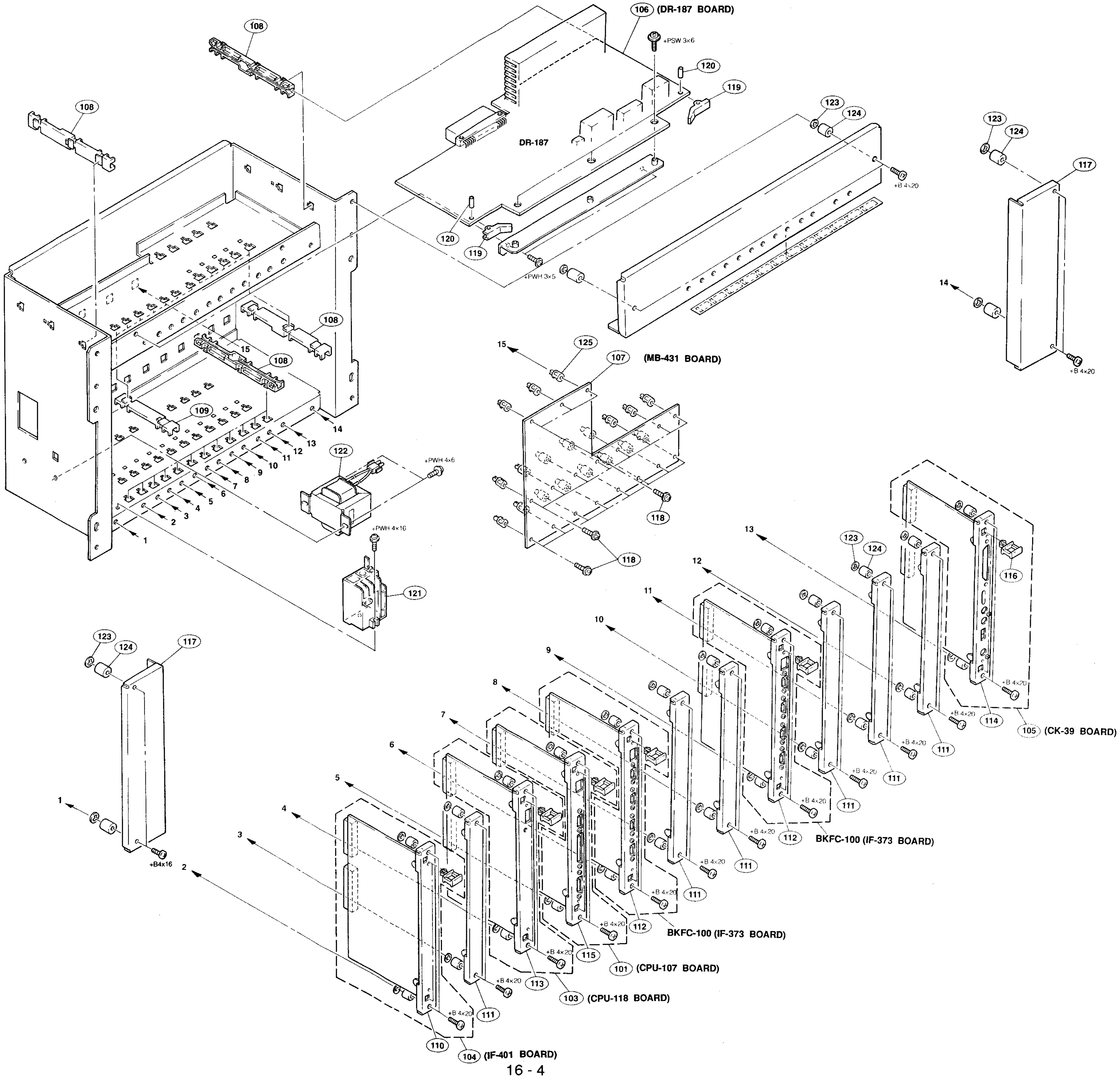
21
13
+PWH 3×6
15
42
*4
36
W6, Poly
41
E3
E2.3
37
*5
39
46
16
*5
W6, Poly
*4
E3
W6, Poly
36
+PWH 3×6
+PWH 3×6
+PWH 3×6
*3
+B 2×10
22
44
26
*3
E2.3
65
77
42
E2.3
71
37
37
46
66
74
+PSW 3×6
+PSW 3×6
68
67
76
70
69
E2.3
E2.3
72
46
46
*8
73
75
+PSW 3×6
+PSW 3×6
*8
18
6
+B 4×14
+B 4×14
57
W4, SMALL
*12
W4, SMALL
W4, SMALL
W4, SMALL
+PSW 3×6
+PSW 3×6
10
9
+PWH 3×6
47
25
29
35
49
+PWH 3×6
+PWH 3×6
+PWH 3×6
+PWH 3×6
+PWH 3×5
14
52
12
*9
51
+B 4×15
+B 4×15
38
*12
55
19
7
24
4
+PWH 3×6
+PWH 3×6
+PWH 3×6
5
54
+PWH 3×6
30
31
32
*10
*9
*11
*1, *2
17
20
+PSW 3×12
+PSW 3×12
LW3 TYPE B
40
E2.3
63
11
E2.3
+PSW 3×6
+PSW 3×6
28
E2.3
E2.3
28
27
+PSW 3×10
62
1
+PSW 3×6
+PWH 3×6
+PWH 3×6
+K 3×8
+PWH 3×6
56
64
53
19
+PSW 3×6
23
8
43
*10
2
57
W4
57
W4
+B 4×14
+B 4×14
*11
59
58
+B 4×10
33
50
SW8
61
50
SW8
61
33
50
SW8
61
50
SW8
61
59
58
+B 4×10
+B 4×14
+B 4×14

*1 BFC-1 (UC) :
S/N 10001 through 10138
BFC-1 (EK) :
S/N 20001 through 20047
BFC-1 (J) :
S/N 30001 through 30015

*2 BFC-1 (UC) :
S/N 10139 and higher
BFC-1 (EK) :
S/N 20048 and higher
BFC-1 (J) :
S/N 30016 and higher

# CONTROLLER BLOCK




106 (DR-187 BOARD)
+PSW 3×6
120
119
108
DR-187
123
124
+B 4×20
117
14
15
125
107 (MB-431 BOARD)
109
13
12
11
10
9
8
7
6
5
4
3
2
1
122
+PWH 4×6
+PWH 4×10
121
118
+PWH 3×5
116
114
111
105 (CK-39 BOARD)
112
BKFC-100 (IF-373 BOARD)
115
101 (CPU-107 BOARD)
113
103 (CPU-118 BOARD)
110
104 (IF-401 BOARD)
+B4x16

## CONTROLLER BLOCK

| No. | Parts No. | SP | Description |
|---|---|---|---|
| 101 | A-8271-765-B | o | MOUNTED CIRCUIT BOARD, CPU-107 |
| 103 | A-8271-768-B | o | MOUNTED CIRCUIT BOARD, CPU-118 |
| 104 | A-8271-769-A | o | MOUNTED CIRCUIT BOARD, IF-401 |
| 105 | A-8271-770-C | o | MOUNTED CIRCUIT BOARD, CK-39 |
| 106 | A-8267-773-A | o | DR-187 ASSY (SERVICE) |
| 107 | A-8276-519-A | o | MOUNTED CIRCUIT BOARD, MB-431 |
| 108 | 3-169-099-01 | o | RAIL, PC BOARD GUIDE |
| 109 | 3-174-468-01 | o | RAIL (60), PC BOARD GUIDE |
| 110 | 3-178-847-01 | o | PANEL (IF-401), CONNECTOR |
| 111 | 3-185-452-01 | o | CONNECTOR, PANEL (NO) |
| 112 | 3-178-855-03 | o | PANEL (IF-373), CONNECTOR |
| 113 | 3-178-856-02 | o | PANEL (CPU-118), CONNECTOR |
| 114 | 3-178-857-04 | o | PANEL (CK-39), CONNECTOR |
| 115 | 3-178-858-03 | o | PANEL (CPU-107), CONNECTOR |
| 116 | 3-172-089-01 | o | HANDLE |
| 117 | 3-185-397-01 | o | PANEL, CN |
| 118 | 3-185-449-01 | s | SCREW, WASHER HEAD |
| 119 | 3-166-184-01 | o | LEVER, PC BOARD |
| 120 | 7-626-320-21 | o | PIN, SPRING (3×10) |
| 121 | 1-424-069-11 | s | COIL, CHOKE 2MMH |
| 122 | 1-515-556-31 | s | RELAY, THERMAL |
| 123 | 3-696-510-01 | s | WASHER (3), STOPPER |
| 124 | 3-714-855-11 | o | SPACER, REAR PANEL |
| 125 | 4-884-992-11 | o | SUPPORT, PC |

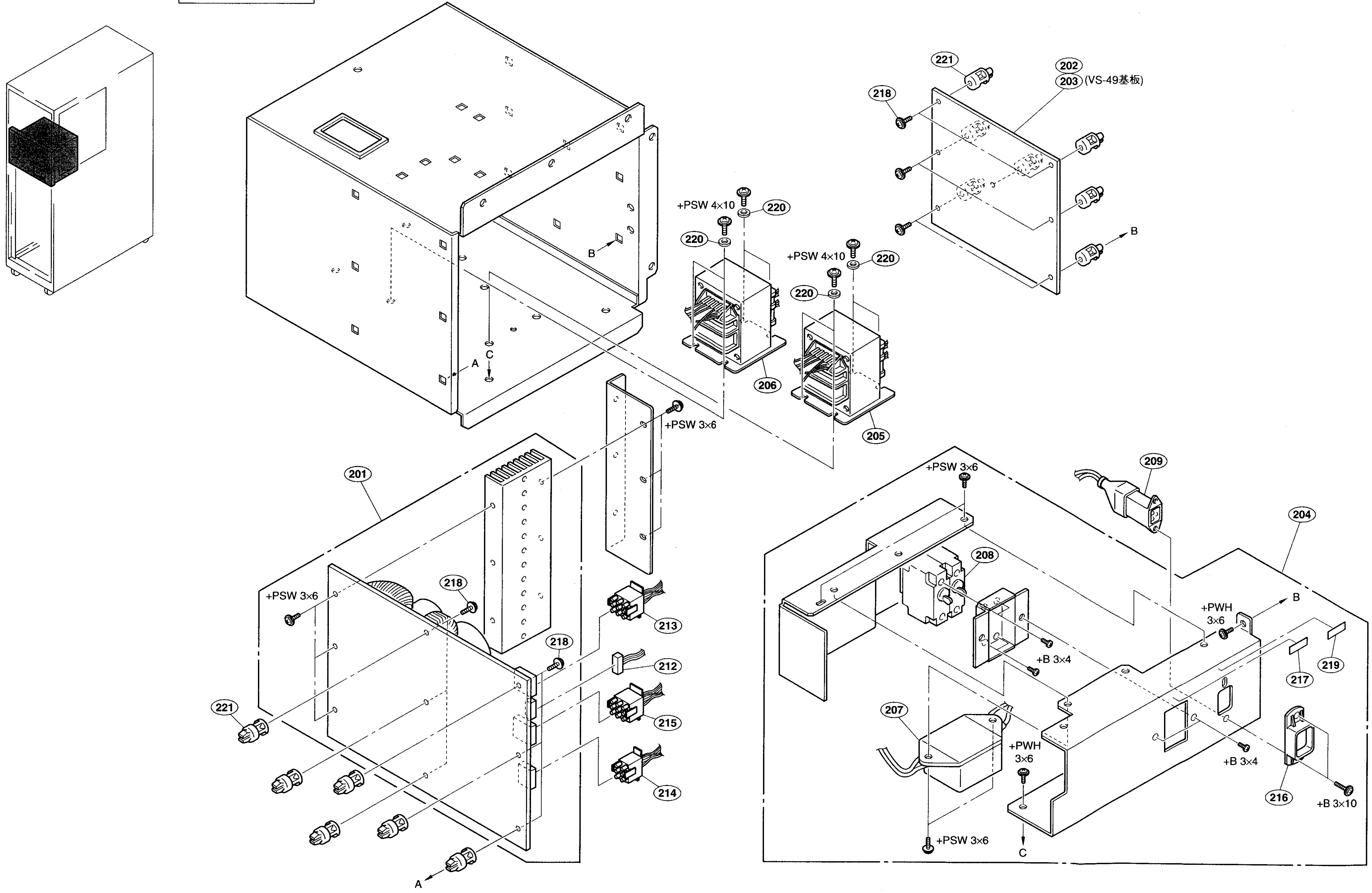
## POWER BOX BLOCK

J ; S/N 30036 and higher
UC ; S/N 10169 and higher
EK ; S/N 20092 and higher

| No. | | Parts No. | SP | Description |
|---|---|---|---|---|
| 201 | | A-8271-862-A | o | MOUNTED CIRCUIT BOARD, PS-330 |
| 202 | | A-8276-757-A | o | MOUNTED CIRCUIT BOARD, VS-49 (J, UC) |
| 203 | | A-8276-758-A | o | MOUNTED CIRCUIT BOARD, VS-49 (EK) |
| 204 | | A-8267-653-C | o | PANEL ASSY, SW |
| 205 | ⚠ | 1-423-580-11 | s | TRANSFORMER, POWER |
| 206 | ⚠ | 1-423-581-11 | s | TRANSFORMER, POWER |
| 207 | ⚠ | 1-424-630-11 | s | FILTER, NOISE (GT-2001) |
| 208 | ⚠ | 1-533-374-11 | s | BREAKER, CIRCUIT |
| 209 | ⚠ | 1-580-375-11 | s | INLET, 3P |
| 212 | | 1-951-284-12 | o | HARNESS (VSM-1) |
| 213 | | 1-951-285-12 | o | HARNESS (VSM-2) |
| 214 | | 1-951-286-11 | o | HARNESS (VDR-1) |
| 215 | | 1-951-287-13 | o | HARNESS (VDR-2) |
| 216 | | 2-990-241-02 | s | HOLDER (A), PLUG |
| 217 | | 3-182-521-01 | o | LABEL (BREAKER) |
| 218 | | 3-185-449-01 | s | SCREW, WASHER HEAD |
| 219 | | 3-679-628-00 | o | LABEL, AC |
| 220 | | 3-723-598-01 | o | SPACER |
| 221 | | 4-884-992-11 | o | SUPPORT, PC |

# POWER BOX BLOCK

J ; S/N 30036 and higher
UC ; S/N 10170 and higher
EK ; S/N 20092 and higher


221
218
202
203 (VS-49基板)
B
+PSW 4×10
220
220
+PSW 4×10
220
220
B
206
205
A
C
+PSW 3×6
201
+PSW 3×6
209
204
208
218
+PSW 3×6
213
218
212
215
214
221
+PWH 3×6
B
+B 3×4
219
217
207
+PWH 3×6
+B 3×4
216
+B 3×10
+PSW 3×6
C
A

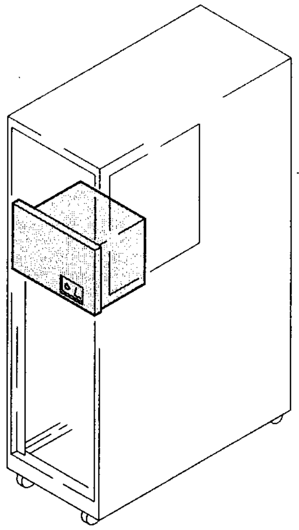
## POWER BOX BLOCK

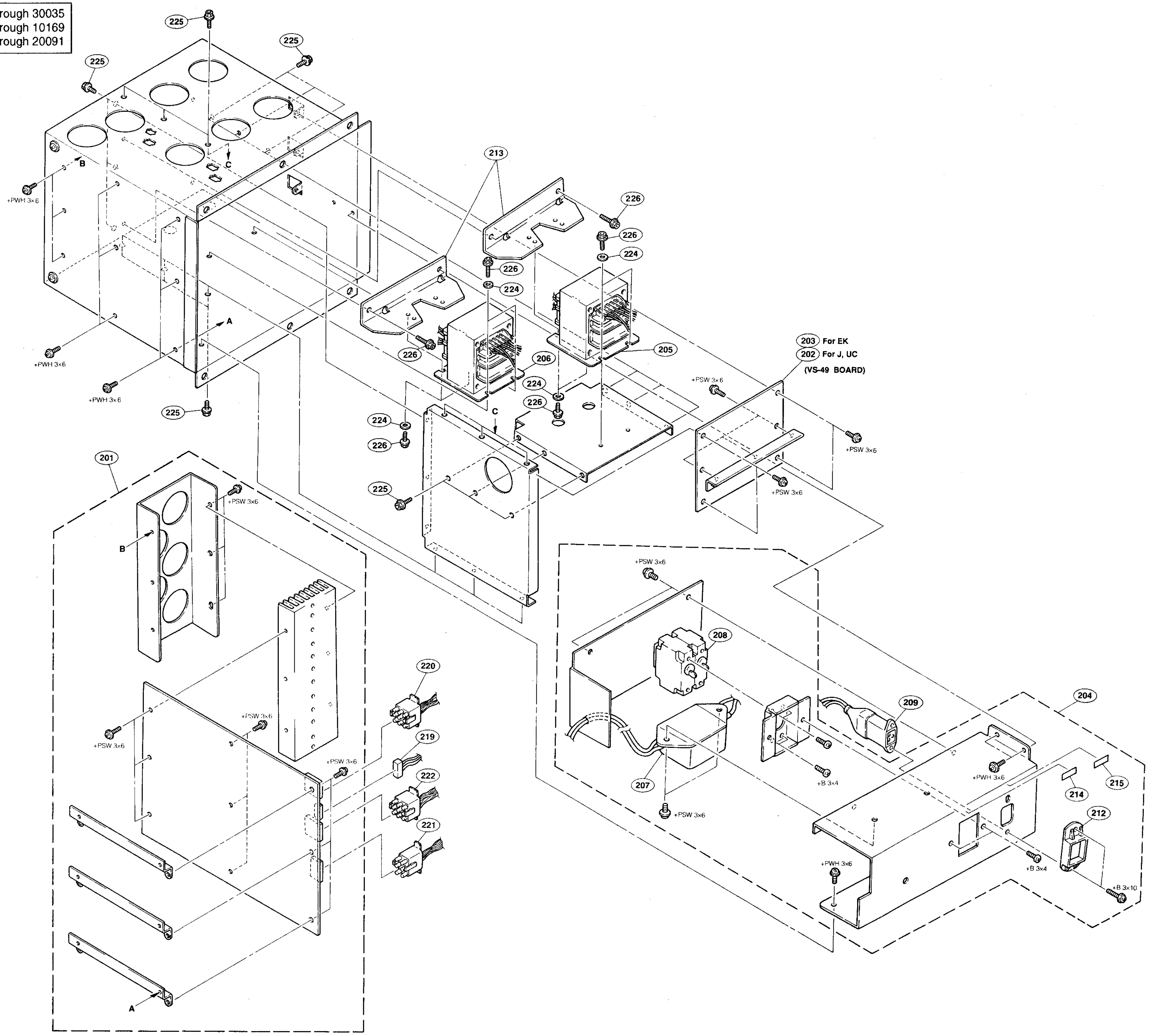
J ; S/N 30001 through 30035
UC ; S/N 10001 through 10169
EK ; S/N 20001 through 20091

| No. | | Parts No. | SP | Description |
|---|---|---|---|---|
| 201 | | A-8271-862-A | o | MOUNTED CIRCUIT BOARD, PS-330 |
| 202 | | A-8276-757-A | o | MOUNTED CIRCUIT BOARD, VS-49 (J, UC) |
| 203 | | A-8276-758-A | o | MOUNTED CIRCUIT BOARD, VS-49 (EK) |
| 204 | | A-8267-653-B | o | PANEL ASSY, SW |
| 205 | ⚠ | 1-423-580-11 | s | TRANSFORMER, POWER |
| 206 | ⚠ | 1-423-581-11 | s | TRANSFORMER, POWER |
| 207 | ⚠ | 1-424-630-11 | s | FILTER, NOISE (GT-2001) |
| 208 | ⚠ | 1-533-374-11 | s | BREAKER, CIRCUIT |
| 209 | ⚠ | 1-580-375-11 | s | INLET, 3P |
| 212 | | 2-990-241-02 | s | HOLDER (A), PLUG |
| 213 | | 3-179-742-02 | o | BREACKIT, TRANSFORMER FITTING |
| 214 | | 3-182-521-01 | o | LABEL (BREAKER) |
| 215 | | 3-679-628-00 | o | LABEL, AC |
| 219 | | 1-951-284-12 | o | HARNESS (VSM-1) |
| 220 | | 1-951-285-12 | o | HARNESS (VSM-2) |
| 221 | | 1-951-286-11 | o | HARNESS (VDR-1) |
| 222 | | 1-951-287-13 | o | HARNESS (VDR-2) |
| 224 | | 4-841-075-01 | s | WASHER UPPER |
| 225 | | 3-730-087-01 | s | BOLT (M3×6), HEXAGON SOCKET, F |
| 226 | | 7-683-418-04 | s | BOLT (M4×6), HOLE, HEXAGON |

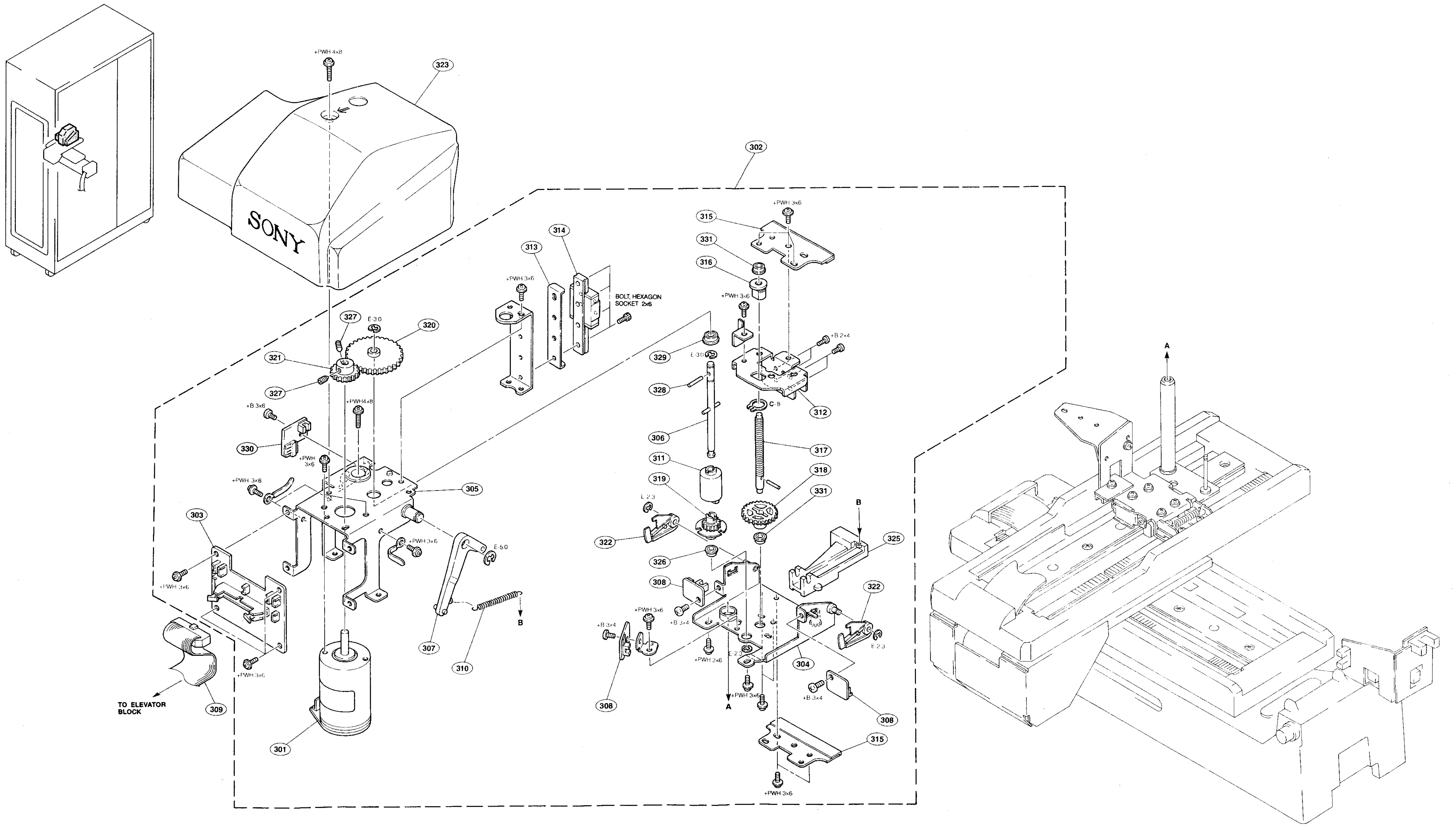
# POWER BOX BLOCK

J ; S/N 30001 through 30035
UC ; S/N 10001 through 10169
EK ; S/N 20001 through 20091




225
225
225
B
C
+PWH 3×6
+PWH 3×6
+PWH 3×6
A
225
213
226
226
224
226
224
226
206
205
224
226
C
224
226
225
203 For EK
202 For J, UC
(VS-49 BOARD)
+PSW 3×6
+PSW 3×6
+PSW 3×6
201
+PSW 3×6
B
+PSW 3×6
+PSW 3×6
+PSW 3×6
A
220
219
222
221
+PSW 3×6
208
209
207
+PSW 3×6
+B 3×4
204
+PWH 3×6
214
215
212
+PWH 3×6
+B 3×4
+B 3×10

# ELEVATOR HAND BLOCK


+PWH 4×8
323
SONY
302
+PWH 3×6
315
331
316
314
313
+PWH 3×6
BOLT, HEXAGON SOCKET 2×6
+PWH 3×6
+B 2×4
327
E-3.0
320
329
E-3.0
321
328
312
327
C-8
+PWH4×8
+B 3×6
A
306
317
330
+PWH 3×6
311
318
305
319
331
+PWH 3×6
E 2.3
B
303
+PWH 3×6
E-5.0
322
325
326
+PWH 3×6
308
322
B
+PWH 3×6
+B 3×4
+B 3×4
307
E 2.3
310
+PWH 3×6
E 2.3
304
+PWH 3×6
+PWH 3×6
308
A
+B 3×4
TO ELEVATOR BLOCK
308
309
315
301
+PWH 3×6

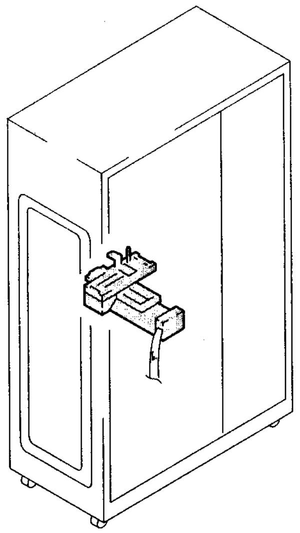
## ELEVATOR HAND BLOCK

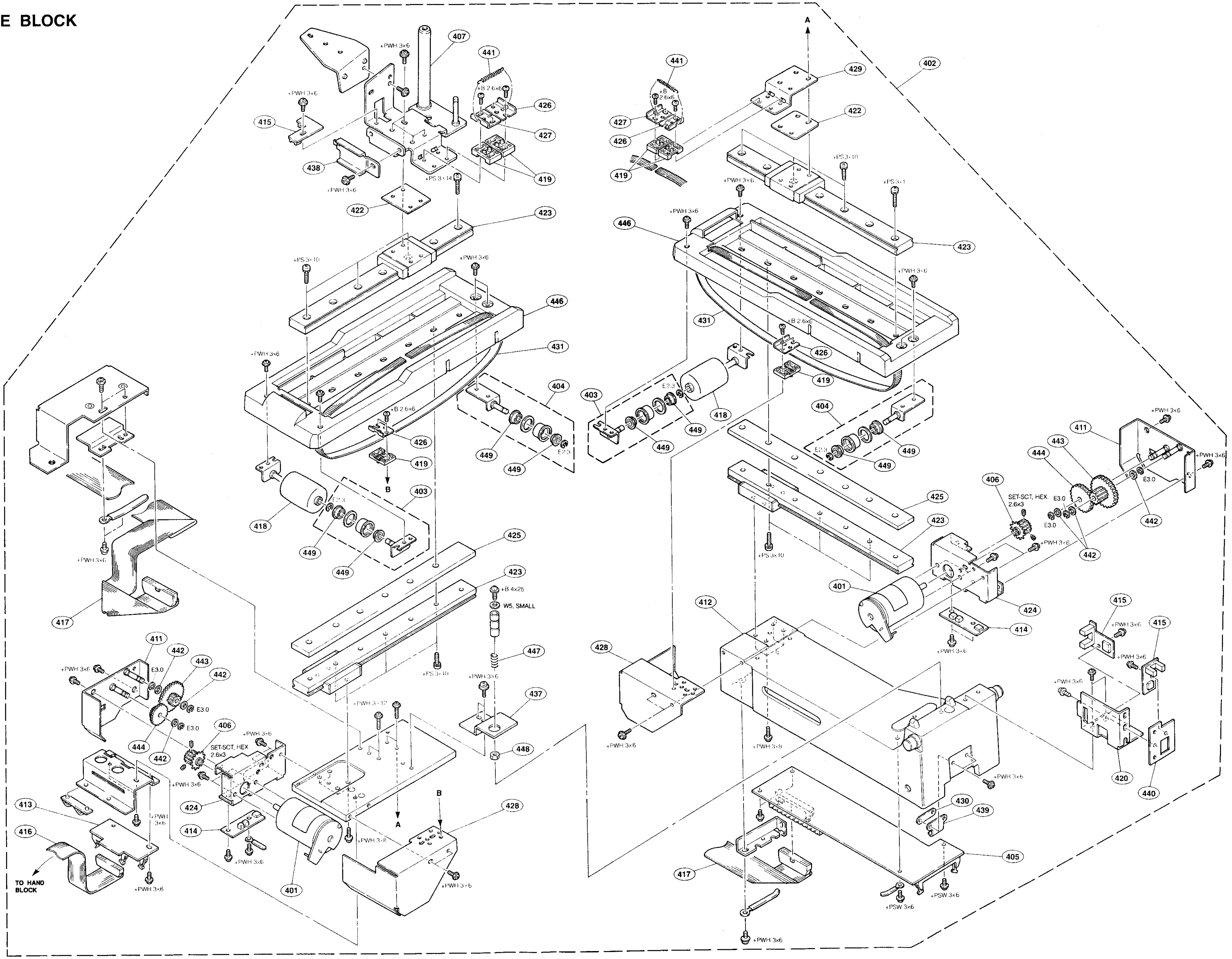
| No. | Parts No. | SP | Description |
|---|---|---|---|
| 301 | A-8267-019-A | s | MOTOR ASSY |
| 302 | A-8267-261-A | s | HAND ASSY |
| 303 | A-8276-525-A | o | MOUNTED CIRCUIT BOARD, CB-49 |
| 304 | X-3166-910-3 | o | BASE ASSY, LOWER |
| 305 | X-3166-911-2 | o | BASE ASSY, UPPER |
| 306 | X-3166-912-2 | o | SHAFT ASSY, MIDWAY |
| 307 | X-3166-946-1 | s | LINK ASSY |
| 308 | 1-646-807-12 | o | PRINTED CIRCUIT BOARD, SE-197 |
| 309 | 1-696-903-13 | s | CABLE, FLAT (ELV-3) |
| 310 | 2-270-833-00 | s | SPRING, TENSION |
| 311 | 3-178-869-01 | o | LIMITER (NTL6), TORQUE |
| 312 | 3-178-870-02 | o | FINGER (BASE) |
| 313 | 3-178-872-01 | o | RETAINER, SLIDER |
| 314 | 3-178-875-01 | o | LINEAR WAY (LWL7) |
| 315 | 3-178-879-01 | s | FINGER |
| 316 | 3-178-882-02 | o | NUT |
| 317 | 3-178-883-03 | o | SHAFT, SCREW |
| 318 | 3-178-884-01 | s | GEAR (A) |
| 319 | 3-178-897-01 | s | GEAR (B) |
| 320 | 3-178-898-02 | s | GEAR (C) |
| 321 | 3-178-899-01 | s | GEAR, MOTOR |
| 322 | 3-178-900-01 | o | SHUTTER |
| 323 | 3-178-906-02 | o | HAND (CAB) |
| 325 | 3-179-458-01 | o | SPATULA |
| 326 | 3-658-259-00 | s | BEARING, BALL |
| 327 | 3-701-505-00 | s | SET SCREW, DOUBLE POINT 3x3 |
| 328 | 3-703-357-07 | s | PIN (DIA. 1.6 SERISE) |
| 329 | 3-722-752-01 | s | BEARING (FLANGED), BALL |
| 330 | 1-649-273-11 | s | PRINTED CIRCUIT BOARD, SE-223 |
| 331 | 3-743-242-01 | s | BEARING (FLANGE), BALL |

## ELEVATOR X/Z STAGE BLOCK

| No. | Parts No. | SP | Description |
|---|---|---|---|
| 401 | A-6279-220-A | s | MOTOR ASSY (A) |
| 402 | A-8267-650-A | s | STAGE ASSY, ELV (SERVICE) |
| 403 | A-8267-015-B | o | PULLEY ASSY (1), BELT |
| 404 | A-8267-016-B | o | PULLEY ASSY (2), BELT |
| 405 | A-8271-773-A | o | MOUNTED CIRCUIT BOARD, CB-47 |
| 406 | X-3166-903-1 | s | GEAR ASSY, MOTOR |
| 407 | X-3166-909-2 | o | BASE ASSY |
| 411 | X-3166-917-1 | o | GEAR (BASE) ASSY |
| 412 | X-3166-920-2 | o | BASE ASSY, X |
| 413 | 1-646-802-11 | o | PRINTED CIRCUIT BOARD, CB-48 |
| 414 | 1-646-805-11 | o | PRINTED CIRCUIT BOARD, SE-195 |
| 415 | 1-646-806-11 | o | PRINTED CIRCUIT BOARD, SE-196 |
| 416 | 1-696-903-13 | s | CABLE, FLAT (ELV-3) |
| 417 | 1-696-904-21 | s | CABLE, FLAT (ELV-2) |
| 418 | 3-178-862-02 | o | PULLEY, HARNESS |
| 419 | 3-178-863-01 | o | PLATE, FIXED, BELT |
| 420 | 3-178-864-02 | o | BRACKET (XY), SENSOR |
| 422 | 3-178-866-01 | o | SPACER (S) |
| 423 | 3-178-876-01 | o | LINEAR WAY (LWLF18) |
| 424 | 3-178-877-01 | o | BRACKET, MOTOR |
| 425 | 3-178-885-01 | o | STOPPER, RAIL |
| 426 | 3-178-886-01 | o | PLATE (1), PAD, BELT |
| 427 | 3-178-887-01 | o | PLATE (2), PAD, BELT |
| 428 | 3-178-888-01 | o | BRACKET (1), BELT |
| 429 | 3-178-889-01 | o | BRACKET (2), BELT |
| 430 | 3-178-890-01 | o | BRACKET, KEEPER |
| 431 | 3-178-914-01 | s | BELT (S2M), TIMING |
| 437 | 3-178-938-02 | o | PLATE (X), SHUTTER |
| 438 | 3-178-939-01 | o | RETAINER, H HARNESS |
| 439 | 3-178-961-02 | s | KEEPER |
| 440 | 3-178-971-01 | o | PLATE, FIXED, Y SENSOR |
| 441 | 3-669-386-00 | s | SPRING, TENSION |
| 442 | 3-701-441-21 | s | WASHER |
| 443 | 3-721-016-01 | s | GEAR (1) |
| 444 | 3-721-017-01 | s | GEAR (2) |
| 446 | 3-178-921-02 | o | BASE, EV |
| 447 | 3-583-507-00 | s | SPRING |
| 448 | 3-680-316-00 | s | NUT (M4), STOPPER |
| 449 | 3-743-242-01 | s | BEARING (FLANGE), BALL |

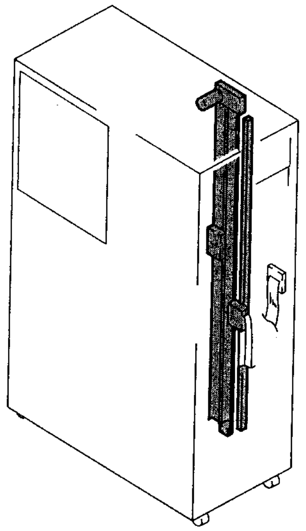
# ELEVATOR X/Z STAGE BLOCK

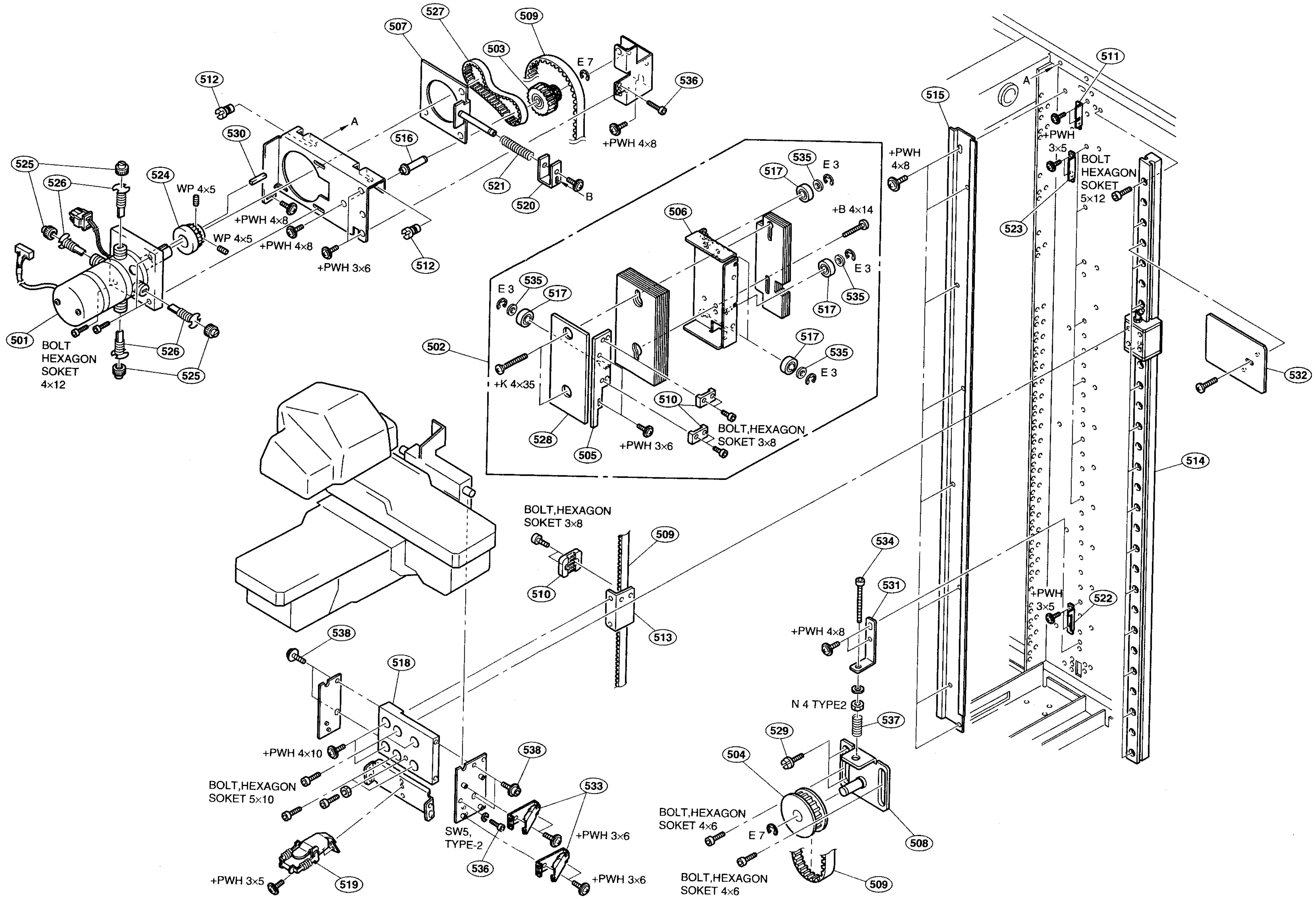



407
+PWH 3×6
441
+B 2.6×6
426
427
419
415
+PWH 3×6
438
+PWH 3×6
+PS 3×14
422
423
+PS 3×10
+PWH 3×6
446
431
+PWH 3×6
+B 2.6×6
426
419
B
404
449
449
E2.3
418
403
E2.3
449
449
425
423
+B 4×25
W5, SMALL
447
+PS 3×10
+PWH 3×6
437
448
417
+PWH 3×6
411
442
443
442
+PWH 3×6
E3.0
E3.0
E3.0
444
442
406
SET-SCT, HEX.
2.6×3
+PWH 3×6
+PWH 3×6
+PWH 3×12
424
414
+PWH 3×6
413
+PWH 3×6
416
TO HAND BLOCK
+PWH 3×6
401
+PWH 3×8
A
B
428
+PWH 3×6
A
441
+B 2.6×6
427
426
419
429
402
422
+PS 3×10
+PWH 3×6
+PS 3×1
446
+PWH 3×6
423
+PWH 3×6
431
+B 2.6×6
426
419
403
E2.3
418
449
449
404
E2.3
449
449
425
423
+PS 3×10
411
+PWH 3×6
443
444
+PWH 3×6
E3.0
406
SET-SCT, HEX.
2.6×3
E3.0
E3.0
+PWH 3×6
442
442
401
424
414
+PWH 3×6
412
428
+PWH 3×6
+PWH 3×8
415
+PWH 3×6
415
+PWH 3×6
+PWH 3×6
420
440
+PWH 3×6
430
439
405
417
+PSW 3×6
+PSW 3×6
+PWH 3×6

## ELEVATOR Y DRIVING BLOCK

J ; S/N 30036 and higher
UC ; S/N 10170 and higher
EK ; S/N 20092 and higher




507
527
509
503
E 7
536
512
530
A
516
521
520
B
+PWH 4×8
525
526
524
WP 4×5
+PWH 4×8
WP 4×5
+PWH 4×8
+PWH 3×6
512
501
BOLT
HEXAGON
SOKET
4×12
526
525
535
E 3
517
506
+B 4×14
E 3
535
517
535
E 3
517
517
535
E 3
502
+K 4×35
510
BOLT,HEXAGON
SOKET 3×8
+PWH 3×6
528
505
515
+PWH
4×8
A
511
+PWH
3×5
BOLT
HEXAGON
SOKET
5×12
523
532
514
BOLT,HEXAGON
SOKET 3×8
509
510
513
534
531
+PWH 4×8
+PWH
3×5
522
N 4 TYPE2
537
529
504
508
BOLT,HEXAGON
SOKET 4×6
E 7
BOLT,HEXAGON
SOKET 4×6
509
538
518
+PWH 4×10
BOLT,HEXAGON
SOKET 5×10
538
533
+PWH 3×6
SW5,
TYPE-2
536
+PWH 3×6
+PWH 3×5
519

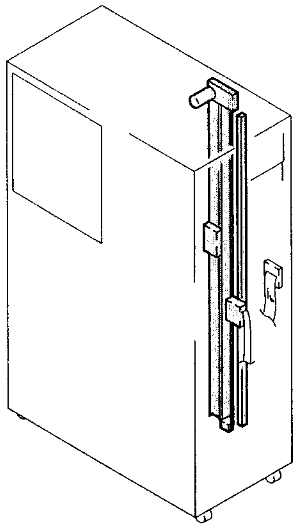
## ELEVATOR Y DRIVING BLOCK

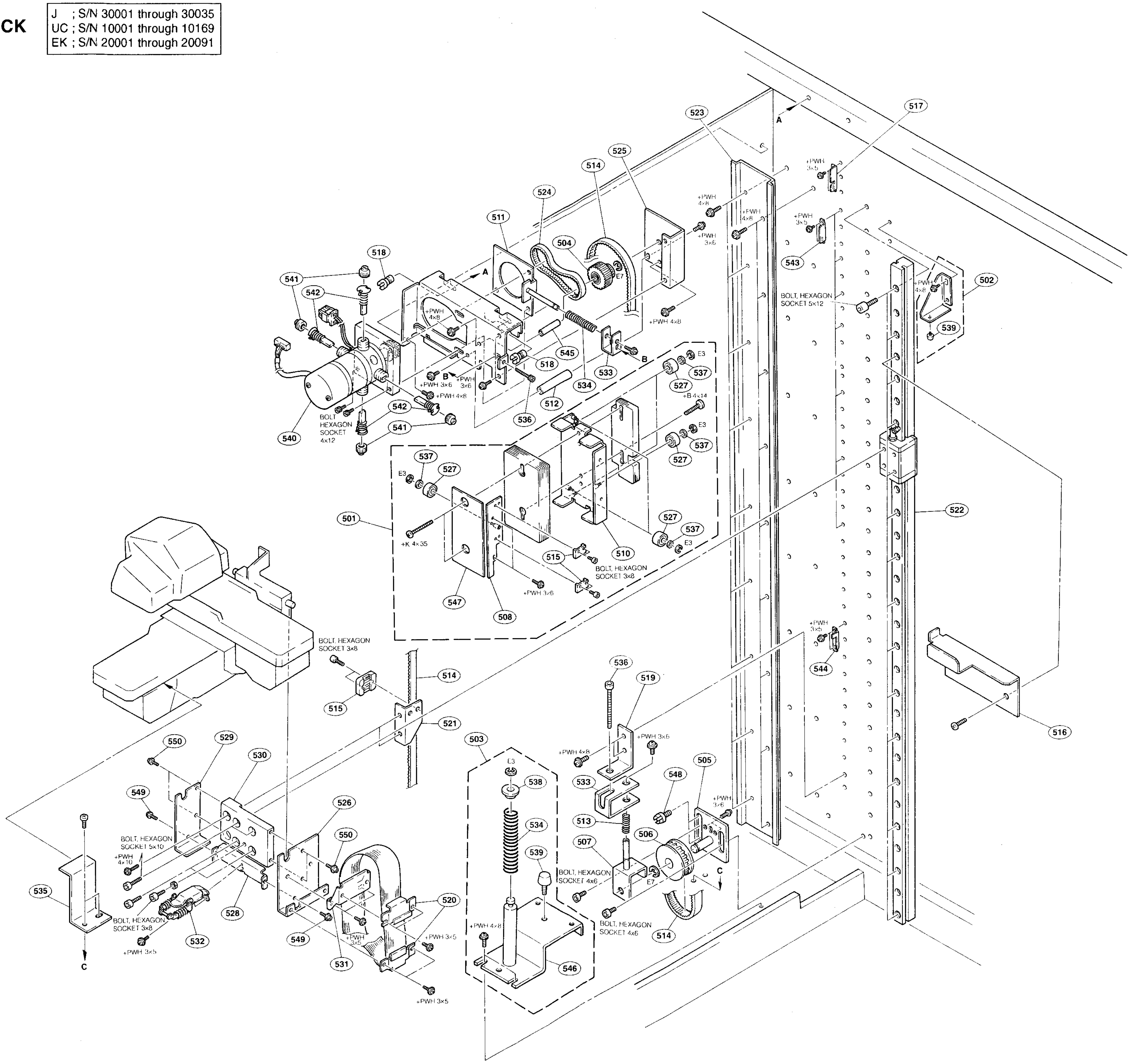
J ; S/N 30036 and higher
UC ; S/N 10170 and higher
EK ; S/N 20092 and higher

| No. | Parts No. | SP | Description |
|---|---|---|---|
| 501 | A-8267-028-B | s | MOTOR, ASSY, SERVO |
| 502 | A-8267-030-A | o | CW ASSY |
| 503 | X-3166-905-2 | s | PULLEY ASSY, MIDWAY |
| 504 | X-3166-907-1 | s | PULLEY (LOWER) SUB ASSY, Y |
| 505 | X-3166-921-2 | o | CW(B) SUB ASSY |
| 506 | X-3166-924-2 | o | CW (A) SUB ASSY |
| 507 | X-3166-925-1 | o | BRACKET SUB ASSY, MOTOR |
| 508 | X-3167-512-1 | o | SHAFT ASSY, Y PULLEY (LOWER) |
| 509 | 3-178-825-12 | s | BELT (L), TIMING |
| 510 | 3-178-826-01 | o | HOLDER, BELT |
| 511 | 3-178-837-01 | o | PLATE (ORIGIN), SHUTTER |
| 512 | 3-178-840-01 | o | SHAFT, FITTING |
| 513 | 3-178-849-04 | o | HOLDER, ELV SIDE BELT |
| 514 | 3-178-891-01 | s | LINEAR WAY (LWHS20) |
| 515 | 3-178-905-03 | o | RAIL, CW |
| 516 | 3-178-929-02 | o | SHAFT, Y PULLEY (UPPER) |
| 517 | 3-178-947-01 | o | ROLLER |
| 518 | 3-178-951-02 | o | PLATE (M), SLIDER, Y |
| 519 | 3-178-953-02 | s | CLIP, CATCHER |
| 520 | 3-178-956-03 | o | PLATE, ADJUSTMENT,BELT |
| 521 | 3-178-957-01 | s | SPRING, COMPRESSION |
| 522 | 3-178-966-01 | s | PLATE (VTR), SHUTTER |
| 523 | 3-178-977-03 | s | PLATE(BIN), SHUTTER |
| 524 | 3-179-507-02 | s | PULLEY BLOCK, MOTOR |
| 525 | 3-179-508-01 | o | CAP |
| 526 | 3-179-509-01 | s | BRUSH |
| 527 | 3-180-083-01 | s | BELT (100S3M276), TIMING |
| 528 | 3-180-087-01 | o | PLATE LID, CW |
| 529 | 3-180-088-01 | o | PIN, STANDARD |
| 530 | 3-185-339-01 | o | KEY (3×3×20) |
| 531 | 3-185-387-01 | o | SUPPORT, ADJUSTTMENT SCREW |
| 532 | 3-185-393-01 | o | SHIPPING,CW |
| 533 | 3-673-796-02 | o | CLAMP,FLAT CABLE |
| 534 | 3-692-944-01 | s | BOLT, HEXAGON SOCKET 4×40 |
| 535 | 3-701-441-21 | s | WASHER |
| 536 | 3-730-087-01 | s | BOLT (M5×10), HEXAGON SOCKET, F |
| 537 | 4-868-049-00 | s | SPRING, COMPRESSION |
| 538 | 7-683-420-04 | o | BOLT, HEXAGON SOCKET 4×10 |

## ELEVATOR Y DRIVING BLOCK

J ; S/N 30001 through 30035
UC ; S/N 10001 through 10169
EK ; S/N 20001 through 20091




523
517
A
525
514
+PWH 3×5
+PWH 4×8
+PWH 4×8
+PWH 3×6
+PWH 3×5
524
511
504
E7
543
502
BOLT, HEXAGON SOCKET 5×12
539
518
541
542
A
+PWH 4×8
+PWH 4×8
+PWH 4×8
545
518
B
B
+PWH 3×6
+PWH 3×6
+PWH 4×8
533
534
E3
537
527
+B 4×14
512
536
542
BOLT HEXAGON SOCKET 4×12
541
540
E3
537
527
537
527
E3
537
527
501
+K 4×35
527
537
E3
515
510
BOLT, HEXAGON SOCKET 3×8
+PWH 3×6
547
508
522
+PWH 3×5
544
516
BOLT HEXAGON SOCKET 3×8
514
515
521
536
519
+PWH 3×6
+PWH 4×8
503
E3
538
533
548
505
534
513
+PWH 3×6
507
506
539
BOLT, HEXAGON SOCKET 4×6
E7
C
BOLT, HEXAGON SOCKET 4×6
514
546
+PWH 4×8
550
529
530
549
BOLT, HEXAGON SOCKET 5×10
+PWH 4×10
526
550
535
BOLT, HEXAGON SOCKET 3×8
+PWH 3×5
C
532
528
549
531
+PWH 3×5
520
+PWH 3×5
+PWH 3×5

## ELEVATOR Y DRIVING BLOCK

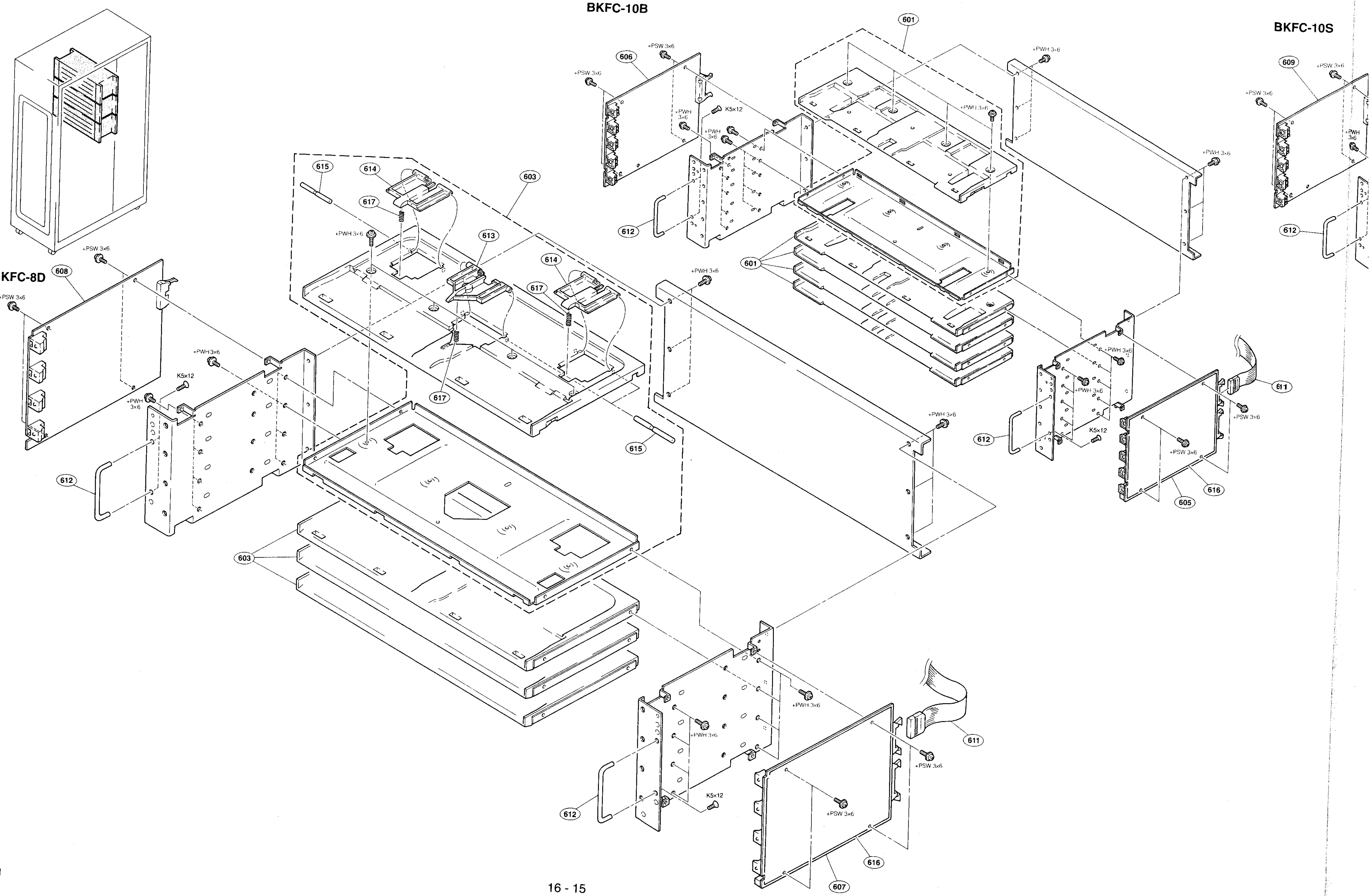
J ; S/N 30001 through 30035
UC ; S/N 10001 through 10169
EK ; S/N 20001 through 20091

| No. | Parts No. | SP | Description |
|---|---|---|---|
| 501 | A-8267-030-A | o | CW ASSY |
| 502 | A-8267-039-A | o | STOPPER ASSY |
| 503 | A-8267-069-A | o | PLATE ASSY, CUSHION |
| 504 | X-3166-905-2 | s | PULLEY ASSY, MIDWAY |
| 505 | X-3166-906-1 | o | SHAFT ASSY, Y PULLEY (LOWER) |
| 506 | X-3166-907-1 | s | PULLEY (LOWER) SUB ASSY, Y |
| 507 | X-3166-908-2 | o | SHAFT ASSY, BELT (L) ADJUSTMENT |
| 508 | X-3166-921-2 | o | CW (B) SUB ASSY |
| 510 | X-3166-924-2 | o | CW (A) SUB ASSY |
| 511 | X-3166-925-1 | o | BRACKET SUB ASSY, MOTOR |
| 512 | 2-066-111-24 | o | SUPPORT |
| 513 | 4-868-049-00 | s | SPRING, COMPRESSION |
| 514 | 3-178-825-12 | s | BELT (L), TIMING |
| 515 | 3-178-826-01 | o | HOLDER, BELT |
| 516 | 3-178-834-02 | o | SHIPPING, CW |
| 517 | 3-178-837-01 | o | PLATE (ORIGIN), SHUTTER |
| 518 | 3-178-840-01 | o | SHAFT, FITTING |
| 519 | 3-178-841-02 | o | SUPPORT, ADJUSTMENT SCREW |
| 520 | 3-178-842-02 | o | RETAINER, HARNESS |
| 521 | 3-178-849-03 | o | HOLDER, ELV SIDE BELT |
| 522 | 3-178-891-01 | s | LINEAR WAY (LWHS20) |
| 523 | 3-178-905-02 | o | RAIL, CW |
| 524 | 3-180-083-01 | s | BELT (100S3M276), TIMING |
| 525 | 3-178-932-03 | o | BRACKET (B), Y PULLEY (UPPER) |
| 526 | 3-178-946-01 | o | PLATE (F), SLIDER |
| 527 | 3-178-947-01 | o | ROLLER |
| 528 | 3-178-949-01 | o | PLATE, FIXED, CATCHER CLIP |
| 529 | 3-178-950-01 | o | PLATE (R), SLIDER, Y |
| 530 | 3-178-951-02 | o | PLATE (M), SLIDER, Y |
| 531 | 3-178-952-04 | o | RETAINER (UPPER), HARNESS |
| 532 | 3-178-953-02 | s | CLIP, CATCHER |
| 533 | 3-178-956-03 | o | PLATE, ADJUSTMENT, BELT |
| 534 | 3-178-957-01 | s | SPRING, COMPRESSION |
| 535 | 3-178-965-01 | o | BRACKET (Y), EV SHIPPING |
| 536 | 3-692-944-01 | s | BOLT, HEXAGON SOCKET 4x40 |
| 537 | 3-701-441-21 | s | WASHER |
| 538 | 3-714-767-01 | o | BEARING, SLIDE |
| 539 | 4-002-730-00 | s | FOOT, REAR |
| 540 | A-8267-028-B | s | MOTOR, ASSY, SERVO |
| 541 | 3-179-508-01 | o | CAP |
| 542 | 3-179-509-01 | s | BRUSH |
| 543 | 3-178-977-03 | s | PLATE (BIN), SHUTTER |
| 544 | 3-178-966-01 | s | PLATE (VTR), SHUTTER |
| 545 | 3-178-929-02 | o | SHAFT, Y PULLEY (UPPER) |
| 546 | X-3166-952-2 | o | SHAFT ASSY, SPRING SUPPORT |
| 547 | 3-180-087-01 | o | PLATE LID, CW |
| 548 | 3-180-088-01 | o | PIN, STANDARD |
| 549 | 3-730-087-01 | s | BOLT (M3×6), HEXAGON SOCKET, F |
| 550 | 7-683-420-04 | o | BOLT, HEXAGON SOCKET 4×10 |

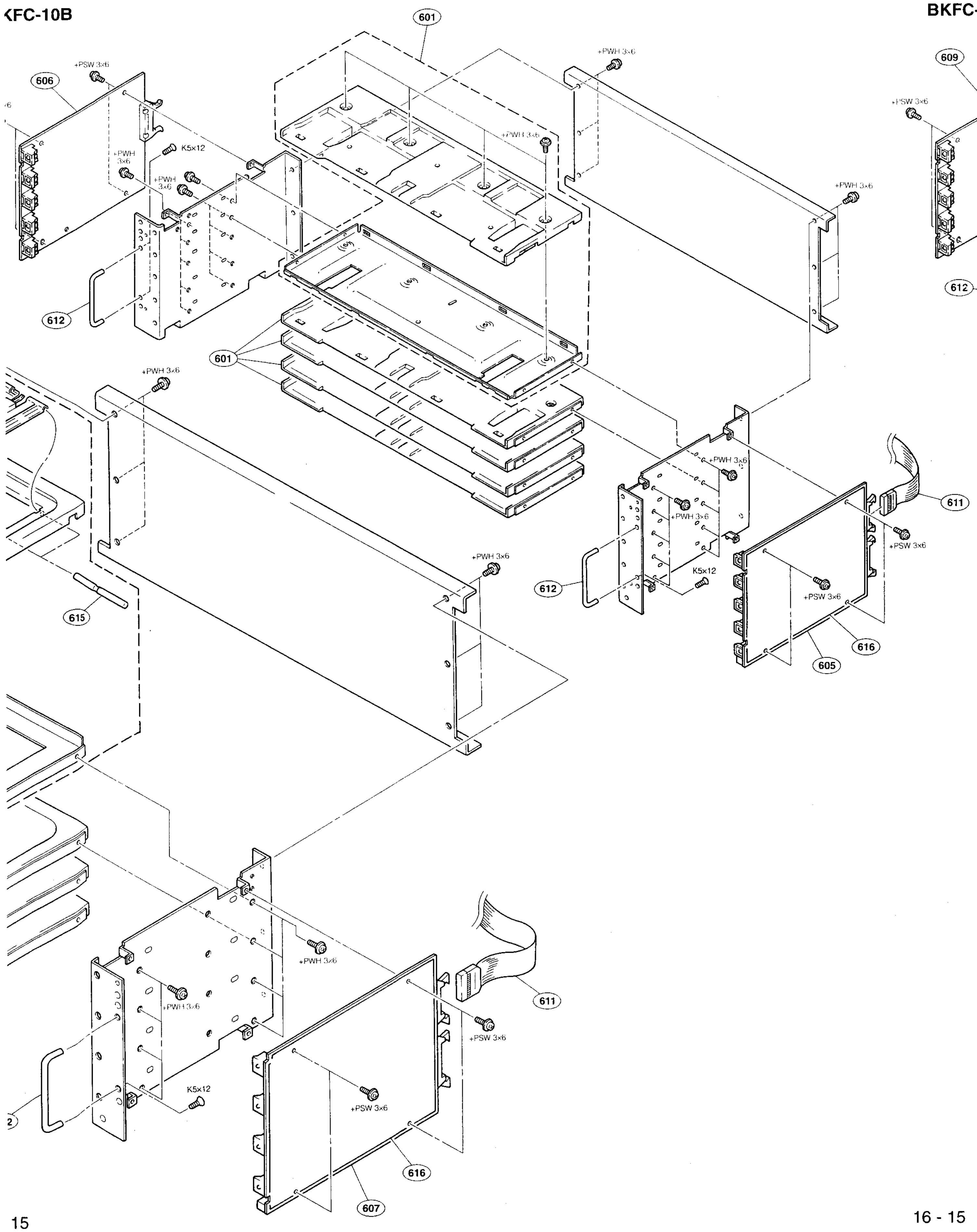
## BIN UNIT

| No. | Parts No. | SP | Description |
|---|---|---|---|
| 601 | A-8267-053-A | s | PLATE ASSY (B), BIN |
| 603 | A-8267-055-A | s | PLATE ASSY (D), BIN |
| 604 | A-8267-057-A | s | PLATE ASSY (V), BIN |
| 605 | A-8271-774-A | o | MOUNTED CIRCUIT BOARD, SE-198 |
| 606 | A-8271-775-A | o | MOUNTED CIRCUIT BOARD, SE-199A |
| 607 | A-8271-776-A | o | MOUNTED CIRCUIT BOARD, SE-200 |
| 608 | A-8271-777-A | o | MOUNTED CIRCUIT BOARD, SE-201 |
| 609 | A-8271-779-A | o | MOUNTED CIRCUIT BOARD, SE-199B |
| 611 | 1-951-172-12 | s | HARNESS (BIN-1) |
| 612 | 2-378-801-01 | o | HANDLE |
| 613 | 3-178-978-02 | o | STOPPER (C) |
| 614 | 3-178-979-01 | o | STOPPER (S) |
| 615 | 3-178-980-01 | o | SHAFT (C), STOPPER |
| 616 | 3-178-982-02 | o | SHEET, INSULATING |
| 617 | 4-333-180-00 | s | SPRING |

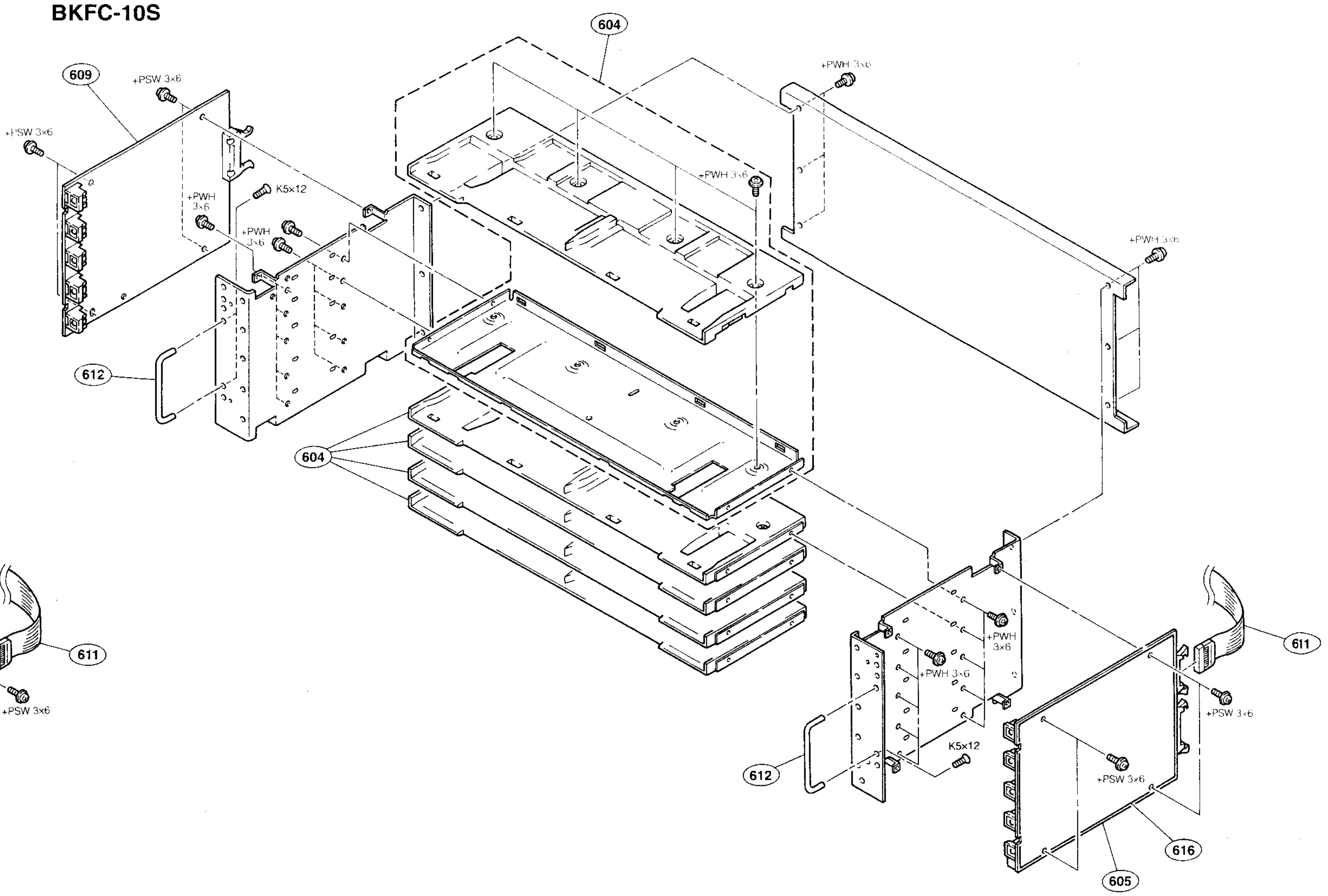
# BIN UNIT


BKFC-10B
BKFC-10S
BKFC-8D
+PSW 3×6
+PWH 3×6
K5×12
+PWH 3×6

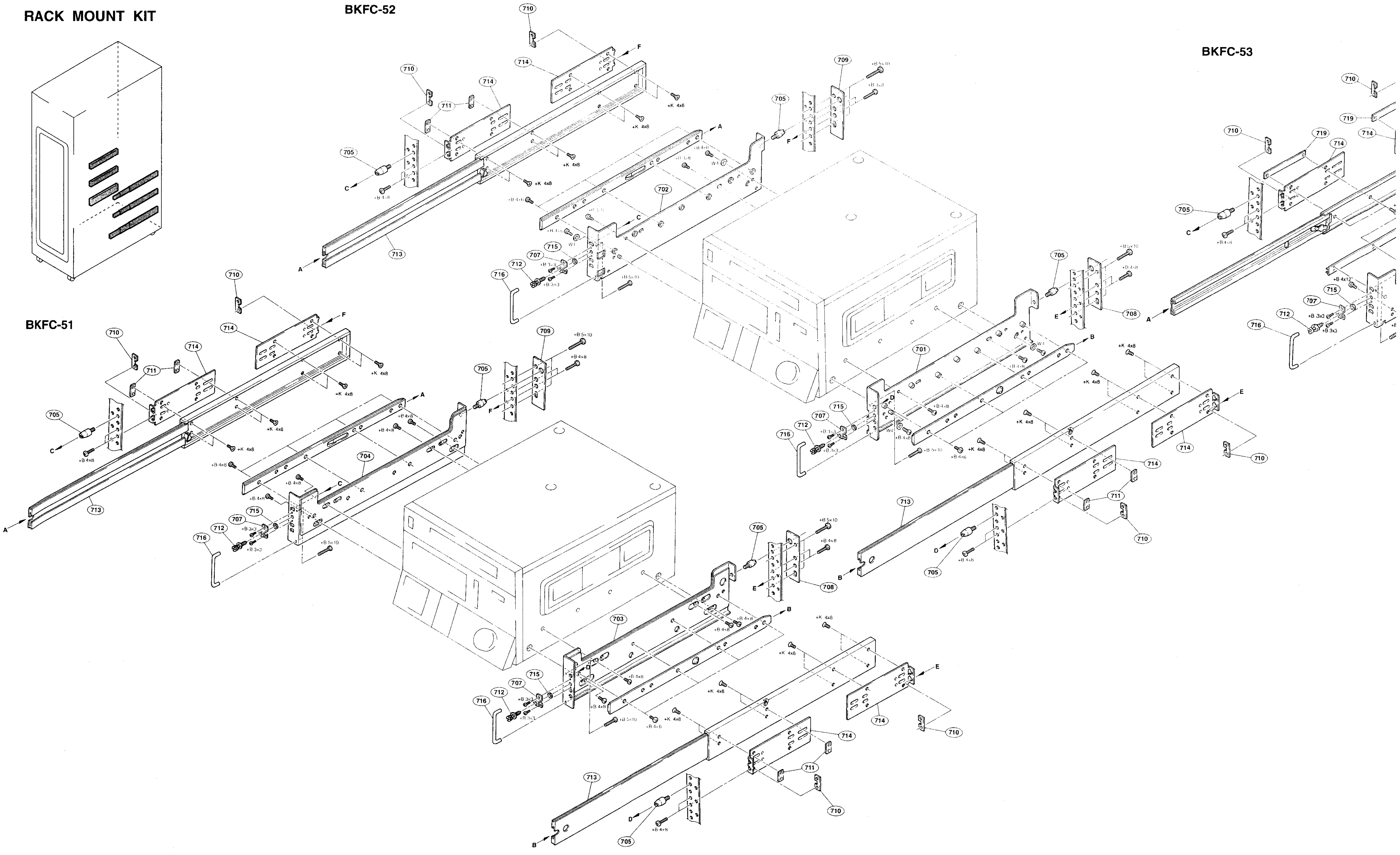
## FC-10B


601
+PWH 3×6
+PSW 3×6
606
+PWH 3×6
K5×12
+PWH 3×6
+PWH 3×6
612
601
+PWH 3×6
+PWH 3×6
+PWH 3×6
611
+PSW 3×6
K5×12
612
+PSW 3×6
616
605
+PWH 3×6
615
+PWH 3×6
+PWH 3×6
611
+PSW 3×6
K5×12
+PSW 3×6
616
607

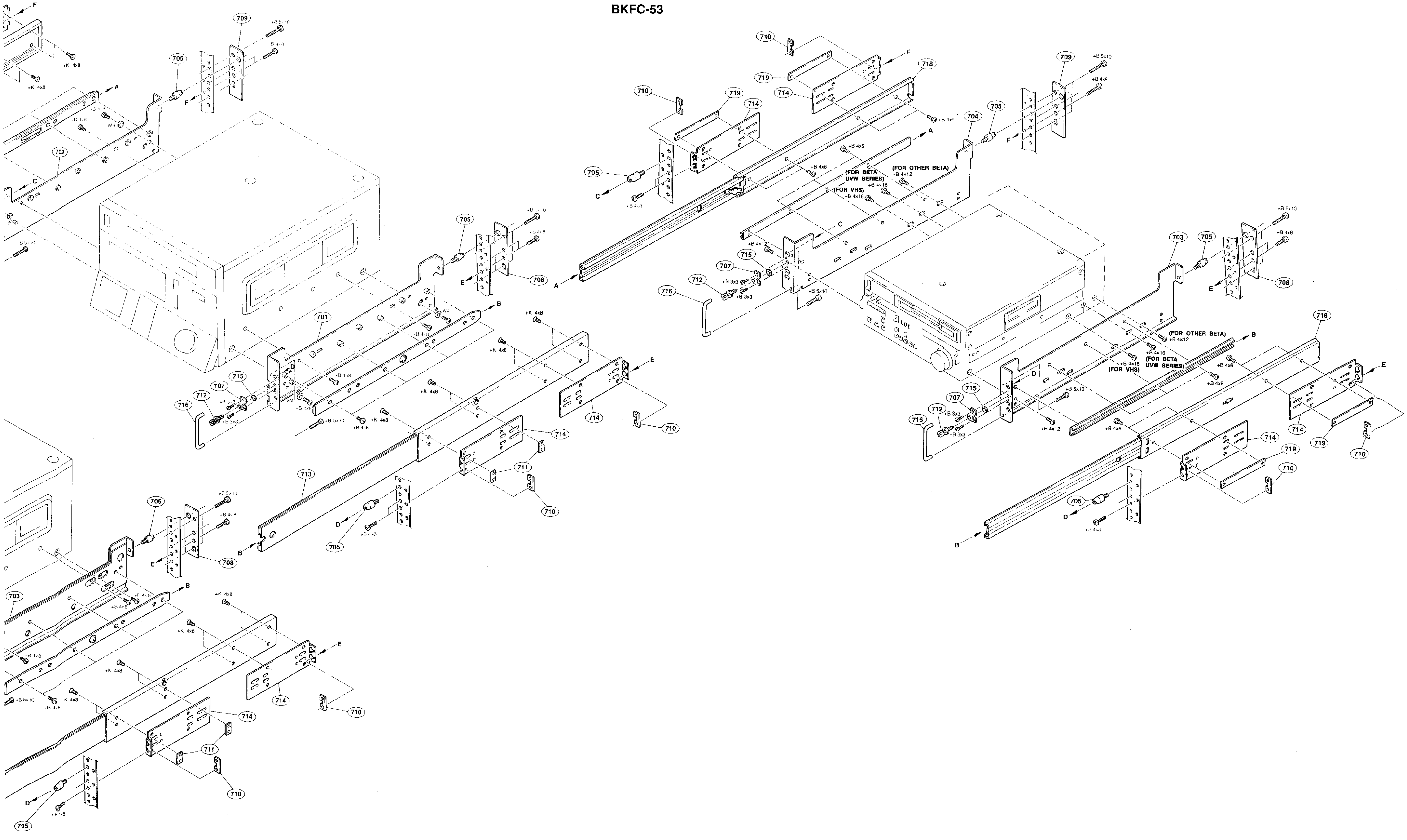
## BKFC-10S


604
609
+PSW 3×6
+PSW 3×6
+PWH 3×6
K5×12
+PWH 3×6
+PWH 3×6
+PWH 3×6
+PWH 3×6
612
604
611
+PWH 3×6
+PWH 3×6
+PSW 3×6
K5×12
612
+PSW 3×6
616
605

## RACK MOUNT KIT


BKFC-52
BKFC-51
BKFC-53
701
702
703
704
705
707
708
709
710
711
712
713
714
715
716
719
A
B
C
D
E
F
+K 4x8
+B 4x8
+B 5x10
+B 3x3
+B 4x12
+B 4x6
W-1

## BKFC-53


701
702
703
704
705
707
708
709
710
711
712
713
714
715
716
718
719
A
B
C
D
E
F
+K 4x8
+B 4x8
+B 5x10
+B 3x3
+B 4x6
+B 4x12
+B 4x16
W4
(FOR BETA UVW SERIES)
(FOR OTHER BETA)
(FOR VHS)

## RACK MOUNT KIT

| No. | Parts No. | SP | Description |
|---|---|---|---|
| 701 | X-3167-513-1 | o | BRACKET ASSY, (R2) RAIL |
| 702 | X-3167-514-1 | o | BRACKET ASSY, (L2) RAIL |
| 703 | 3-185-383-01 | o | BRACKET (R1) RAIL |
| 704 | 3-185-384-01 | o | BRACKET (L1) RAIL |
| 705 | 3-178-964-01 | s | PIN, STANDARD |
| 707 | 3-179-515-02 | o | RETAINER, SCREW |
| 708 | 3-179-516-01 | o | PLATE (R), STANDARD |
| 709 | 3-179-517-01 | o | PLATE (L), STANDARD |
| 710 | 3-179-518-01 | o | NUT (F), PLATE |
| 711 | 3-179-519-01 | o | D, NUT, PLATE |
| 712 | 3-179-520-01 | o | SCREW (M5), FOOT LONG KNURL KNOB |
| 713 | 3-179-521-01 | s | RAIL, FLAT TYPE SLIDE |
| 714 | 3-179-524-02 | o | RAKE |
| 715 | 3-179-525-01 | o | WASHER (M5) |
| 716 | 3-179-526-01 | o | HANDLE |
| 718 | 2-378-851-02 | o | RAIL (NDT-130), SLIDE |
| 719 | 2-378-848-01 | o | NAT (A), PLATE |

## 16-3. ELECTRICAL PARTS LIST

### RESISTOR(CARBON)

| Part No. | SP | Description |
|---|---|---|
| 1-249-385-11 | s | RES, CARBON 2.2 5% 1/4W |
| 1-249-396-11 | s | RES, CARBON 18 5% 1/4W |
| 1-249-397-11 | s | RES, CARBON 22 5% 1/4W |
| 1-249-401-11 | s | RES, CARBON 47 5% 1/4W |
| 1-249-405-11 | s | RES, CARBON 100 5% 1/4W |
| 1-249-407-11 | s | RES, CARBON 150 5% 1/4W |
| 1-249-409-11 | s | RES, CARBON 220 5% 1/4W |
| 1-249-410-11 | s | RES, CARBON 270 5% 1/4W |
| 1-249-411-11 | s | RES, CARBON 330 5% 1/4W |
| 1-249-413-11 | s | RES, CARBON 470 5% 1/4W |
| 1-249-414-11 | s | RES, CARBON 560 5% 1/4W |
| 1-249-415-11 | s | RES, CARBON 680 5% 1/4W |
| 1-249-416-11 | s | RES, CARBON 820 5% 1/4W |
| 1-249-417-11 | s | RES, CARBON 1.0k 5% 1/4W |
| 1-249-418-11 | s | RES, CARBON 1.2k 5% 1/4W |
| 1-249-419-11 | s | RES, CARBON 1.5k 5% 1/4W |
| 1-249-420-11 | s | RES, CARBON 1.8k 5% 1/4W |
| 1-249-421-11 | s | RES, CARBON 2.2k 5% 1/4W |
| 1-249-422-11 | s | RES, CARBON 2.7k 5% 1/4W |
| 1-249-423-11 | s | RES, CARBON 3.3k 5% 1/4W |
| 1-249-424-11 | s | RES, CARBON 3.9k 5% 1/4W |
| 1-249-425-11 | s | RES, CARBON 4.7k 5% 1/4W |
| 1-249-426-11 | s | RES, CARBON 5.6k 5% 1/4W |
| 1-249-427-11 | s | RES, CARBON 6.8k 5% 1/4W |
| 1-249-428-11 | s | RES, CARBON 8.2k 5% 1/4W |
| 1-249-429-11 | s | RES, CARBON 10k 5% 1/4W |
| 1-249-430-11 | s | RES, CARBON 12k 5% 1/4W |
| 1-249-432-11 | s | RES, CARBON 18k 5% 1/4W |
| 1-249-433-11 | s | RES, CARBON 22k 5% 1/4W |
| 1-249-435-11 | s | RES, CARBON 33k 5% 1/4W |
| 1-249-437-11 | s | RES, CARBON 47k 5% 1/4W |
| 1-249-441-11 | s | RES, CARBON 100k 5% 1/4W |

## CB-47 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8271-773-A | o | MOUNTED CIRCUIT BOARD, CB-47 |
| C1 | 1-126-947-11 | s | ELECT 47uF 20% 35V |
| C2 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C3 | 1-126-947-11 | s | ELECT 47uF 20% 35V |
| C4 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C5 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C6 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C7 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C8 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C9 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C10 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C11 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C12 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C13 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C14 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C15 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C16 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C17 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C18 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C19 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C20 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C21 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C22 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C23 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C24 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| CN1 | 1-506-700-11 | o | HEADER 34P, MALE |
| CN2 | 1-506-699-11 | o | CONNECTOR, LCSC 26P, MALE |
| CN3 | 1-564-006-11 | s | CONNECTOR 7P, MALE |
| CN4 | 1-564-002-11 | s | PIN, CONNECTOR 3P |
| CN5 | 1-506-468-11 | s | CONNECTOR 3P, MALE |
| D1 | 8-719-820-12 | s | LED TLR224, RED |
| D2 | 8-719-820-12 | s | LED TLR224, RED |
| D3 | 8-719-820-12 | s | LED TLR224, RED |
| D4 | 8-719-820-12 | s | LED TLR224, RED |
| D5 | 8-719-820-12 | s | LED TLR224, RED |
| D6 | 8-719-820-12 | s | LED TLR224, RED |
| D7 | 8-719-820-12 | s | LED TLR224, RED |
| D8 | 8-719-820-12 | s | LED TLR224, RED |
| D9 | 8-719-820-12 | s | LED TLR224, RED |
| D10 | 8-719-820-12 | s | LED TLR224, RED |
| D11 | 8-719-820-12 | s | LED TLR224, RED |
| D12 | 8-719-820-12 | s | LED TLR224, RED |
| D13 | 8-719-820-12 | s | LED TLR224, RED |
| ICA2 | 8-759-902-44 | s | IC SN74LS244N |
| ICA3 | 8-759-904-76 | s | IC AM26LS31CN |
| ICA4 | 8-759-916-20 | s | IC SN74HC14N |
| ICA5 | 8-759-916-20 | s | IC SN74HC14N |
| ICA6 | 8-759-916-20 | s | IC SN74HC14N |
| ICB2 | 8-759-904-76 | s | IC AM26LS31CN |
| ICB3 | 8-759-902-44 | s | IC SN74LS244N |
| ICB4 | 8-759-902-44 | s | IC SN74LS244N |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

## CB-48 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | 1-646-802-11 | o | PRINTED CIRCUIT BOARD, CB-48 |
| CN1 | 1-506-699-11 | o | CONNECTOR, LCSC 26P, MALE |
| CN2 | 1-506-697-11 | o | HEADER 16P, MALE |
| CN3 | 1-506-472-11 | s | CONNECTOR 7P, MALE |

## CB-49 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8276-525-A | o | MOUNTED CIRCUIT BOARD, CB-49 |
| CN1 | 1-506-697-11 | o | HEADER 16P, MALE |
| CN2 | 1-506-468-11 | s | CONNECTOR 3P, MALE |
| CN3 | 1-506-468-11 | s | CONNECTOR 3P, MALE |
| CN4 | 1-564-002-11 | s | PIN, CONNECTOR 3P |
| CN5 | 1-564-002-11 | s | PIN, CONNECTOR 3P |
| CN6 | 1-564-002-41 | s | PIN, CONNECTOR 3P |
| CN7 | 1-564-002-41 | s | PIN, CONNECTOR 3P |
| CN8 | 1-564-004-11 | o | PIN, CONNECTOR 5P |

J ; S/N 30001 thru 30035
UC ; S/N 10001 thru 10169
EK ; S/N 20001 thru 20091

## CB-50 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | 1-646-804-11 | o | PRINTED CIRCUIT BOARD, CB-50 |
| CN1 | 1-560-176-00 | o | CONNECTOR, 2P, MALE |
| CN2 | 1-560-176-00 | o | CONNECTOR, 2P, MALE |
| CN3 | 1-560-362-00 | o | CONNECTOR, 10P, MALE |
| CN4 | 1-506-706-11 | o | CONNECTOR, ILG 8P, MALE |

J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher

## CB-61 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | 1-648-995-11 | o | PRINTED CIRCUIT BOARD, CB-61 |
| CN1 | 1-506-702-11 | o | CONNECTOR, ILG 3P |
| CN2 | 1-506-702-11 | o | CONNECTOR, ILG 3P |
| CN3 | 1-506-703-11 | o | CONNECTOR, ILG 4P |
| CN4 | 1-560-365-00 | o | CONNECTOR, ILG 3P |
| CN5 | 1-560-365-00 | o | CONNECTOR, ILG 3P |
| CN6 | 1-560-366-00 | o | CONNECTOR, ILG 4P |
| CN7 | 1-560-370-00 | o | CONNECTOR, ILG 10P |

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

## CK-39 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| # 1pc | A-8271-770-C | o | MOUNTED CIRCUIT BOARD, CK-39 |
| # 2pcs | 3-172-089-01 | o | HANDLE |
| # 1pcs | 3-178-857-04 | o | PANEL (CK-39), CONNECTOR |
| # 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| # 2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| # 2pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| # 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| # 2pcs | 7-682-949-01 | s | SCREW +PSW 3x10 |
| # 2pcs | 7-685-648-79 | s | SCREW +BVTP 3X12 |
| # 2pcs | 7-688-004-11 | s | W 4, MIDDLE |
| # 2pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| # BNC1 | 1-691-431-11 | s | CONNECTOR, BNC, FEMALE |
| # BNC2 | 1-691-431-11 | s | CONNECTOR, BNC, FEMALE |
| # BNC3 | 1-691-431-11 | s | CONNECTOR, BNC, FEMALE |
| C1 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C2 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C3 | 1-126-947-11 | s | ELECT 47uF 20% 35V |
| C4 | 1-126-947-11 | s | ELECT 47uF 20% 35V |
| C5 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C6 | 1-126-947-11 | s | ELECT 47uF 20% 35V |
| C7 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C8 | 1-126-947-11 | s | ELECT 47uF 20% 35V |
| C9 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C10 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C11 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C12 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C13 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C14 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C15 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C16 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C17 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C18 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C19 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C20 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C21 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C22 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C23 | 1-107-157-00 | s | MICA 27pF 5% 500V |
| C24 | 1-107-209-00 | s | MICA 20pF 5% 500V |
| C25 | 1-162-710-11 | s | CERAMIC 100pF 1% 50V |
| C26 | 1-162-710-11 | s | CERAMIC 100pF 1% 50V |
| C27 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C28 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C29 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C30 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C31 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C32 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C33 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C34 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C35 | 1-107-158-00 | s | MICA 30pF 5% 500V |
| C36 | 1-107-209-00 | s | MICA 20pF 5% 500V |
| C37 | 1-126-947-11 | s | ELECT 47uF 20% 35V |
| C38 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C39 | 1-126-947-11 | s | ELECT 47uF 20% 35V |
| C40 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C41 | 1-162-179-11 | s | CERAMIC 0.1uF 50V |
| C42 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C43 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C44 | 1-124-584-00 | s | ELECT 100uF 20% 10V |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

(CK-39 BOARD(BFC-1))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| C45 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C46 | 1-162-179-11 | s | CERAMIC 0.1uF 50V |
| C47 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C48 | 1-126-947-11 | s | ELECT 47uF 20% 35V |
| C49 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C50 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C51 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C52 | 1-162-179-11 | s | CERAMIC 0.1uF 50V |
| C53 | 1-162-179-11 | s | CERAMIC 0.1uF 50V |
| C54 | 1-126-162-11 | s | ELECT 3.3uF 20% 50V |
| C55 | 1-126-162-11 | s | ELECT 3.3uF 20% 50V |
| C56 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C57 | 1-126-163-11 | s | ELECT 4.7uF 20% 50V |
| C58 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C59 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C60 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C61 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| CN1 | 1-568-144-11 | o | CONNECTOR, DIN 96P, MALE |
| CN2 | 1-563-781-21 | s | CONNECTOR, D-SUB 50P, FEMALE |
| D1 | 8-719-821-38 | s | LED TLG224, GRN |
| D2 | 8-719-821-38 | s | LED TLG224, GRN |
| D3 | 8-719-821-38 | s | LED TLG224, GRN |
| D4 | 8-719-812-43 | s | LED TLG124A, GRN |
| D5 | 8-719-911-19 | s | DIODE 1SS119 |
| D6 | 8-719-911-19 | s | DIODE 1SS119 |
| D7 | 8-719-911-19 | s | DIODE 1SS119 |
| IC1 | 8-759-917-05 | s | IC SN74HC541N |
| IC2 | 8-759-917-06 | s | IC SN74HC574N |
| IC3 | 8-759-912-21 | s | IC SN74ALS245AN |
| IC4 | 8-759-906-70 | s | IC SN74LS670N |
| IC5 | 8-759-946-63 | s | IC SN74ALS541N |
| IC6 | 8-759-917-43 | s | IC SN74HC138N |
| IC7 | 8-759-917-05 | s | IC SN74HC541N |
| IC8 | 8-759-917-06 | s | IC SN74HC574N |
| IC9 | 8-759-917-06 | s | IC SN74HC574N |
| IC10 | 8-759-906-70 | s | IC SN74LS670N |
| IC11 | 8-759-917-43 | s | IC SN74HC138N |
| IC12 | 8-759-917-06 | s | IC SN74HC574N |
| IC13 | 8-759-245-40 | s | IC TD62003P |
| IC14 | 8-759-245-40 | s | IC TD62003P |
| IC15 | 8-759-916-22 | s | IC SN74HC21N |
| IC16 | 8-759-917-43 | s | IC SN74HC138N |
| IC17 | 8-759-917-05 | s | IC SN74HC541N |
| IC18 | 8-759-245-40 | s | IC TD62003P |
| IC19 | 8-759-032-81 | s | IC MC74HC74AN |
| IC20 | 8-759-917-18 | s | IC SN74HCU04N |
| IC21 | 8-759-916-14 | s | IC SN74HC04N |
| IC22 | 8-759-900-67 | s | IC SN74ALS02N |
| IC23 | 8-759-909-72 | s | IC CX7912A |
| IC24 | 8-759-972-26 | s | IC LM1881N |
| IC25 | 8-759-972-26 | s | IC LM1881N |
| IC26 | 8-759-140-53 | s | IC UPD4053BC |
| IC27 | 8-752-326-08 | s | IC CXD1159Q |
| IC28 | 8-759-045-38 | s | IC MC14538BCP |
| IC29 | 8-759-503-91 | s | IC TL082CP |
| IC30 | 8-759-904-38 | s | IC SN74ALS32N |
| PH1 | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

### (CK-39 BOARD(BFC-1))

| Ref. No. or Q'ty | | Part No. | SP | Description |
|---|---|---|---|---|
| PH2 | | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |
| PH3 | | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |
| PH4 | | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |
| PH5 | | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |
| PH6 | | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |
| PH7 | | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |
| PH8 | | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |
| PH9 | | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |
| PH10 | | 8-749-924-02 | s | PHOTO COUPLER PS2502-4 |
| PS1 | ⚠ | 1-532-686-21 | s | LINK, IC 2.7A |
| Q1 | | 8-729-119-76 | s | TRANSISTOR 2SA1115P |
| Q2 | | 8-729-119-78 | s | TRANSISTOR 2SC2785-HFE |
| R30 | | 1-215-414-00 | s | METAL 510 1% 1/6W |
| R31 | | 1-247-903-00 | s | CARBON 1M 5% 1/4W |
| R32 | | 1-247-903-00 | s | CARBON 1M 5% 1/4W |
| R51 | | 1-247-903-00 | s | CARBON 1M 5% 1/4W |
| R52 | | 1-215-414-00 | s | METAL 510 1% 1/6W |
| R69 | | 1-215-488-00 | s | METAL 620k 1% 1/6W |
| R70 | | 1-247-899-11 | s | CARBON 680k 5% 1/4W |
| R92 | | 1-247-891-00 | s | CARBON 330k 5% 1/4W |
| R93 | | 1-247-887-00 | s | CARBON 220k 5% 1/4W |
| R95 | | 1-247-887-00 | s | CARBON 220k 5% 1/4W |
| R97 | | 1-247-804-11 | s | CARBON 75 5% 1/4W |
| S1 | | 1-570-358-11 | s | SWITCH, SLIDE |
| X1 | | 1-567-299-11 | s | CRYSTAL 14.187500MHz |
| X2 | | 1-579-694-21 | s | CERAMIC 4.91500MHz |
| X3 | | 1-567-866-11 | s | CRYSTAL, 14.31818MHz |

### CPU-107 BOARD(BFC-1)

| | Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|---|
| # | 1pc | A-8271-765-B | o | MOUNTED CIRCUIT BOARD, CPU-107 |
| # | 2pcs | 3-172-089-01 | o | HANDLE |
| # | 1pc | 3-178-858-03 | o | PANEL (CPU-107), CONNECTOR |
| # | 2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| # | 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| # | 2pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| | 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| # | 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| | 6pcs | 7-682-903-31 | s | SCREW +PWH 3X10 |
| | BT1 | 1-528-163-11 | s | NICKEL CADMIUM |
| | C1 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C2 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C3 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C4 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C5 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| | C6 | 1-127-487-00 | s | ALUMN SOLID 4.7uF 20% 10V |
| | C7 | 1-126-157-11 | s | ELECT 10uF 20% 16V |
| | C8 | 1-126-163-11 | s | ELECT 4.7uF 20% 50V |
| | C9 | 1-126-157-11 | s | ELECT 10uF 20% 16V |
| | C10 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C11 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| | C12 | 1-162-710-11 | s | CERAMIC 100pF 1% 50V |
| | C13 | 1-162-710-11 | s | CERAMIC 100pF 1% 50V |
| | C14 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| | C15 | 1-126-157-11 | s | ELECT 10uF 20% 16V |
| | C16 | 1-162-179-11 | s | CERAMIC 0.1uF 50V |
| | C17 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C18 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C19 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C20 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C21 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| | C22 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C23 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C24 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C25 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C26 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C27 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C28 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C29 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C30 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C31 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C32 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C33 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C34 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C35 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C36 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C37 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C38 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C39 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C40 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C41 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C42 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C43 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C44 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C45 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C46 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C47 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| | C48 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| C49 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| CN2 | 1-563-322-11 | s | CONNECTOR,D-SUB 25P, FEMALE |
| CN3 | 1-563-323-11 | s | CONNECTOR, D-SUB 9P, FEMALE |
| CN4 | 1-563-323-11 | s | CONNECTOR, D-SUB 9P, FEMALE |
| CN5 | 1-568-144-11 | o | CONNECTOR, DIN 96P, MALE |
| D1 | 8-719-987-87 | s | DIODE ERA85-009 |
| D2 | 8-719-987-87 | s | DIODE ERA85-009 |
| D3 | 8-719-820-12 | s | LED TLR224, RED |
| D4 | 8-719-987-87 | s | DIODE ERA85-009 |
| D5 | 8-719-987-87 | s | DIODE ERA85-009 |
| D6 | 8-719-987-87 | s | DIODE ERA85-009 |
| D7 | 8-719-920-05 | s | DIODE SLP281C-50 |
| IC1 | 8-759-972-58 | s | IC MAX238CNG |
| IC2 | 8-759-904-80 | s | IC 74F04PC |
| IC3 | 8-759-008-57 | s | IC MC34051P |
| IC4 | 8-759-917-18 | s | IC SN74HCU04N |
| IC5 | 8-759-158-17 | s | IC TMP68301AF-16 |
| IC6 | 8-759-900-69 | s | IC SN74ALS74AN |
| IC7 | 8-759-982-70 | s | IC SN74LS07N |
| # IC8 | 1-540-077-11 | o | SOCKET, IC(PGA) 68P |
| IC9 | 8-759-904-84 | s | IC 74F74PC |
| IC10 | 8-759-939-36 | s | IC TL7705ACP |
| IC11 | 8-759-001-87 | s | IC 74F20PC |
| IC12 | 8-759-323-02 | s | IC HM628128LFP-10 |
| IC13 | 8-759-984-85 | s | IC SCI7701YJA |
| # IC14 | 8-759-270-95 | o | IC 27C240-CPU107V120 |
| IC15 | 8-759-001-87 | s | IC 74F20PC |
| IC16 | 8-759-001-87 | s | IC 74F20PC |
| IC17 | 8-759-916-71 | s | IC SN74HC244N |
| IC18 | 8-759-917-43 | s | IC SN74HC138N |
| IC19 | 8-759-916-71 | s | IC SN74HC244N |
| IC20 | 8-759-916-96 | s | IC SN74HC374N |
| IC21 | 8-759-323-02 | s | IC HM628128LFP-10 |
| IC22 | 8-759-916-96 | s | IC SN74HC374N |
| IC23 | 8-759-904-38 | s | IC SN74ALS32N |
| IC24 | 8-759-916-71 | s | IC SN74HC244N |
| IC25 | 8-759-001-87 | s | IC 74F20PC |
| IC26 | 8-759-904-38 | s | IC SN74ALS32N |
| IC27 | 8-759-916-96 | s | IC SN74HC374N |
| IC28 | 8-759-946-63 | s | IC SN74ALS541N |
| IC29 | 8-759-912-21 | s | IC SN74ALS245AN |
| IC30 | 8-759-946-63 | s | IC SN74ALS541N |
| IC31 | 8-759-946-63 | s | IC SN74ALS541N |
| IC32 | 8-759-946-63 | s | IC SN74ALS541N |
| IC33 | 8-759-946-63 | s | IC SN74ALS541N |
| ICA14 | 1-526-662-21 | o | SOCKET, IC (DP) 40P |
| ND1 | 8-719-901-68 | s | LED GL-6R202, RED |
| PS1 | ⚠ 1-532-686-21 | s | LINK, IC 2.7A |
| Q1 | 8-729-900-89 | s | TRANSISTOR DTC144ES |
| R20 | 1-247-903-00 | s | CARBON 1M 5% 1/4W |
| RB1 | 1-235-724-11 | s | RESISTOR BLOCK 10kx8 |
| RB2 | 1-235-724-11 | s | RESISTOR BLOCK 10kx8 |
| RB3 | 1-235-724-11 | s | RESISTOR BLOCK 10kx8 |
| RB4 | 1-235-724-11 | s | RESISTOR BLOCK 10kx8 |
| RB5 | 1-235-724-11 | s | RESISTOR BLOCK 10kx8 |
| RB6 | 1-235-724-11 | s | RESISTOR BLOCK 10kx8 |
| RB7 | 1-235-724-11 | s | RESISTOR BLOCK 10kx8 |
| RB8 | 1-235-714-11 | s | RESISTOR BLOCK 1.5kx8 |
| RB9 | 1-235-715-11 | s | RESISTOR BLOCK 1.8kx8 |
| S1 | 1-552-509-00 | s | SWITCH, DIP 1-CKT |
| S2 | 1-554-151-00 | s | SWITCH, PUSH SLIDE |
| S3 | 1-554-088-41 | s | SWITCH, PUSH |
| S4 | 1-570-623-11 | s | SWITCH, DIP 8-CKT |
| S5 | 1-570-623-11 | s | SWITCH, DIP 8-CKT |
| S6 | 1-554-080-00 | s | SWITCH, DIGITAL |
| S7 | 1-554-088-41 | s | SWITCH, PUSH |
| X1 | 1-579-694-21 | s | CERAMIC 4.91500MHz |
| X2 | 1-567-787-11 | s | OSCILLATOR, CRYSTAL 32.00000MHz |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

## CPU-118 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| # 1pc | A-8271-768-B | o | MOUNTED CIRCUIT BOARD, CPU-118 |
| # 2pcs | 3-172-089-01 | o | HANDLE |
| # 1pc | 3-178-856-02 | o | PANEL (CPU-118), CONNECTOR |
| # 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| # 2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| # 2pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| # 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| # 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| # C1 | 1-162-289-31 | s | CERAMIC 390pF 10% 50V |
| C5 | 1-162-710-11 | s | CERAMIC 100pF 1% 50V |
| C6 | 1-162-710-11 | s | CERAMIC 100pF 1% 50V |
| C7 | 1-162-179-11 | s | CERAMIC 0.1uF 50V |
| C8 | 1-126-157-11 | s | ELECT 10uF 20% 16V |
| C9 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C10 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C11 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C12 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C13 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C14 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C15 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C16 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C17 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C18 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C19 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C20 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C21 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C22 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C23 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C27 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C28 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C29 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C30 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C32 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C33 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C34 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C35 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C36 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C37 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C38 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C39 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C40 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C41 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C42 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C43 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C44 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C45 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C46 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C47 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C48 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C49 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C50 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C51 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| # C52 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| CN4 | 1-568-144-11 | o | CONNECTOR, DIN 96P, MALE |
| D1 | 8-719-820-12 | s | LED TLR224, RED |
| D5 | 8-719-920-05 | s | DIODE SLP281C-50 |
| IC2 | 8-759-917-18 | s | IC SN74HCU04N |

(CPU-118 BOARD(BFC-1))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| IC4 | 8-759-904-84 | s | IC 74F74PC |
| IC5 | 8-759-939-36 | s | IC TL7705ACP |
| IC6 | 8-759-982-70 | s | IC SN74LS07N |
| IC7 | 8-759-158-17 | s | IC TMP68301AF-16 |
| # IC8 | 1-540-077-11 | o | SOCKET, IC (PGA) 68P |
| IC9 | 8-759-904-80 | s | IC 74F04PC |
| # IC10 | 8-759-270-96 | o | IC 27C240-CPU118V120, EPROM |
| IC11 | 8-759-904-83 | s | IC 74F32PC |
| IC12 | 8-759-916-21 | s | IC SN74HC20N |
| IC13 | 8-759-904-83 | s | IC 74F32PC |
| IC14 | 8-759-973-43 | s | IC MB8421-90LPFQ |
| IC15 | 8-759-515-08 | s | IC SN74ALS374AN |
| IC16 | 8-759-946-63 | s | IC SN74ALS541N |
| IC17 | 8-759-946-63 | s | IC SN74ALS541N |
| IC18 | 8-759-912-21 | s | IC SN74ALS245AN |
| IC20 | 8-759-323-02 | s | IC HM628128LFP-10 |
| IC21 | 8-759-323-02 | s | IC HM628128LFP-10 |
| IC22 | 8-759-900-11 | s | IC SN74LS11N |
| IC23 | 8-759-916-21 | s | IC SN74HC20N |
| IC24 | 8-759-946-63 | s | IC SN74ALS541N |
| C25 | 8-759-917-43 | s | IC SN74HC138N |
| IC26 | 8-759-916-96 | s | IC SN74HC374N |
| IC27 | 8-759-916-96 | s | IC SN74HC374N |
| IC28 | 8-759-917-05 | s | IC SN74HC541N |
| IC30 | 8-759-912-21 | s | IC SN74ALS245AN |
| IC31 | 8-759-946-63 | s | IC SN74ALS541N |
| IC32 | 8-759-946-63 | s | IC SN74ALS541N |
| IC33 | 8-759-946-63 | s | IC SN74ALS541N |
| ICA10 | 1-526-662-21 | o | SOCKET, IC (DP) 40P |
| ND1 | 8-719-901-68 | s | LED GL-6R202, RED |
| PS1 | ⚠ 1-532-686-21 | s | LINK, IC 2.7A |
| R3 | 1-247-903-00 | s | CARBON 1M 5% 1/4W |
| # R62 | 1-249-404-00 | s | CARBON 825% 1/4W |
| RB1 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| RB2 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| RB3 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| RB4 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| RB5 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| RB6 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| RB7 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| RB8 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| RB9 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| RB10 | 1-231-410-00 | s | RESISTOR BLOCK 10kx8 |
| S2 | 1-554-088-41 | s | SWITCH, PUSH |
| S3 | 1-570-623-11 | s | SWITCH, DIP 8-CKT |
| S4 | 1-554-088-41 | s | SWITCH, PUSH |
| X1 | 1-579-694-21 | s | CERAMIC 4.91500MHz |
| X2 | 1-567-787-11 | s | OSCILLATOR, CRYSTAL 32.00000MHz |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

## DP-178 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8271-767-A | o | MOUNTED CIRCUIT BOARD, DP-178 |
| C1 | 1-128-394-11 | s | ELECT 220uF 20% 10V |
| C2 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C3 | 1-128-394-11 | s | ELECT 220uF 20% 10V |
| C4 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C5 | 1-128-394-11 | s | ELECT 220uF 20% 10V |
| C6 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C7 | 1-216-202-00 | s | METAL, CHIP 1.5k 5% 1/8W |
| C8 | 1-216-202-00 | s | METAL, CHIP 1.5k 5% 1/8W |
| C9 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C10 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C11 | 1-216-202-00 | s | METAL, CHIP 1.5k 5% 1/8W |
| C12 | 1-216-202-00 | s | METAL, CHIP 1.5k 5% 1/8W |
| C13 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C14 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C15 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C16 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C17 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C18 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C19 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C20 | 1-163-275-11 | s | CERAMIC, CHIP 0.001uF 5% 50V |
| C21 | 1-163-275-11 | s | CERAMIC, CHIP 0.001uF 5% 50V |
| C22 | 1-126-398-11 | s | ELECT, CHIP 4.7uF 20% 35V |
| C23 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C24 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C25 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C26 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C27 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C28 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C29 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C30 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C31 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C32 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C33 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C34 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C35 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C36 | 1-128-393-11 | s | ELECT 100uF 20% 10V |
| C37 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C38 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C39 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C40 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C41 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C42 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| C43 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| # C44 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| CN1 | 1-506-695-11 | o | HEADER 34P, MALE |
| D1 | 8-719-987-43 | s | TRANSISTOR CL-150PG-CD |
| D2 | 8-719-802-36 | s | DIODE 1SS250 |
| D3 | 8-719-955-05 | s | DIODE BR5505S |
| D4 | 8-719-955-05 | s | DIODE BR5505S |
| D5 | 8-719-955-05 | s | DIODE BR5505S |
| D6 | 8-719-955-05 | s | DIODE BR5505S |
| D7 | 8-719-955-05 | s | DIODE BR5505S |
| D8 | 8-719-955-05 | s | DIODE BR5505S |
| D9 | 8-719-955-05 | s | DIODE BR5505S |
| D10 | 8-719-955-05 | s | DIODE BR5505S |
| D11 | 8-719-955-05 | s | DIODE BR5505S |

(DP-178 BOARD(BFC-1))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| D12 | 8-719-955-05 | s | DIODE BR5505S |
| D13 | 8-719-955-05 | s | DIODE BR5505S |
| D14 | 8-719-955-05 | s | DIODE BR5505S |
| D15 | 8-719-955-05 | s | DIODE BR5505S |
| D16 | 8-719-955-05 | s | DIODE BR5505S |
| E1 | 1-535-877-22 | s | CHIP, CHECKER |
| E2 | 1-535-877-22 | s | CHIP, CHECKER |
| E3 | 1-535-877-22 | s | CHIP, CHECKER |
| IC1 | 8-759-072-59 | s | IC TMPZ84C011BF-6 |
| IC2 | 8-759-917-43 | s | IC SN74HC138N |
| IC3 | 8-759-942-12 | s | IC MBM2212-25P |
| IC4 | 8-759-173-08 | o | IC 27C256-DP178V101, EPROM |
| IC5 | 8-759-912-21 | s | IC SN74ALS245AN |
| IC6 | 8-759-916-25 | s | IC SN74HC32N |
| IC7 | 8-759-946-63 | s | IC SN74ALS541N |
| IC8 | 8-759-973-43 | s | IC MB8421-90LPFQ |
| IC9 | 8-759-239-47 | s | IC TC74HC123AP |
| IC10 | 8-759-916-16 | s | IC MC74HC08AN |
| IC11 | 8-759-946-63 | s | IC SN74ALS541N |
| IC12 | 8-759-914-03 | s | IC SN74LS06N |
| IC13 | 8-759-916-79 | s | IC SN74HC273N |
| IC14 | 8-759-916-71 | s | IC SN74HC244N |
| IC15 | 8-759-916-79 | s | IC SN74HC273N |
| ICA4 | 1-526-659-00 | o | SOCKET, IC 28P |
| # JW3 | 1-217-666-31 | s | RES, SHORT, 0.01 1/6W |
| L1 | 1-409-339-00 | s | COIL, CHOKE |
| L2 | 1-409-339-00 | s | COIL, CHOKE |
| L3 | 1-409-339-00 | s | COIL, CHOKE |
| ND1 | 8-719-951-27 | s | DIODE LM-035DU-A |
| ND2 | 8-719-951-27 | s | DIODE LM-035DU-A |
| ND3 | 8-719-951-27 | s | DIODE LM-035DU-A |
| ND4 | 8-719-951-27 | s | DIODE LM-035DU-A |
| ND5 | 8-719-951-27 | s | DIODE LM-035DU-A |
| ND6 | 8-719-951-27 | s | DIODE LM-035DU-A |
| ND7 | 8-719-951-27 | s | DIODE LM-035DU-A |
| ND8 | 8-719-951-27 | s | DIODE LM-035DU-A |
| PS1 | ⚠ 1-532-686-21 | s | LINK, IC 2.7A |
| PS2 | ⚠ 1-532-686-21 | s | LINK, IC 2.7A |
| Q1 | 8-729-900-98 | s | TRANSISTOR DTC143TK |
| # Q2 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| # Q3 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| Q4 | 8-729-900-98 | s | TRANSISTOR DTC143TK |
| # Q5 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| # Q6 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| Q7 | 8-729-900-98 | s | TRANSISTOR DTC143TK |
| Q8 | 8-729-900-98 | s | TRANSISTOR DTC143TK |
| # Q9 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| # Q10 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| Q11 | 8-729-900-98 | s | TRANSISTOR DTC143TK |
| # Q12 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| # Q13 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| Q14 | 8-729-900-98 | s | TRANSISTOR DTC143TK |
| Q15 | 8-729-900-98 | s | TRANSISTOR DTC143TK |
| # Q16 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| # Q17 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| Q19 | 8-729-900-98 | s | TRANSISTOR DTC143TK |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher

## DR-187 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8267-773-A | o | DR-187 ASSY |
| 2pcs | 3-166-184-01 | o | LEVER, PC BOARD |
| # 3pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| 8pcs | 4-026-252-00 | s | WASHER, INSULATING |
| 8pcs | 4-857-833-00 | s | INSULATOR, 03P |
| 9pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| 10pcs | 4-812-134-11 | s | RIVET NYLON, 3.5 |
| C1 | 1-126-948-11 | s | ELECT 100uF 20% 35V |
| C2 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C3 | 1-124-122-11 | s | ELECT 100uF 20% 50V |
| C4 | 1-162-896-11 | s | CERAMIC 0.01uF 10% 50V |
| C5 | 1-126-948-11 | s | ELECT 100uF 20% 35V |
| C6 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C7 | 1-126-948-11 | s | ELECT 100uF 20% 35V |
| C8 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C9 | 1-126-948-11 | s | ELECT 100uF 20% 35V |
| C10 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C11 | 1-124-122-11 | s | ELECT 100uF 20% 50V |
| C12 | 1-162-896-11 | s | CERAMIC 0.01uF 10% 50V |
| C13 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C14 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C15 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C16 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C17 | 1-162-896-11 | s | CERAMIC 0.01uF 10% 50V |
| C18 | 1-162-896-11 | s | CERAMIC 0.01uF 10% 50V |
| C19 | 1-162-896-11 | s | CERAMIC 0.01uF 10% 50V |
| C20 | 1-162-896-11 | s | CERAMIC 0.01uF 10% 50V |
| C21 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C22 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C23 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C24 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C25 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C26 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C27 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C28 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C29 | 1-131-345-00 | s | ELECT 0.47uF 10% 35V |
| C30 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C32 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C34 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C36 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C37 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C38 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C39 | 1-130-480-00 | s | MYLAR 0.0056uF 5% 50V |
| C40 | 1-130-480-00 | s | MYLAR 0.0056uF 5% 50V |
| C41 | 1-130-480-00 | s | MYLAR 0.0056uF 5% 50V |
| C42 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C43 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C44 | 1-130-480-00 | s | MYLAR 0.0056uF 5% 50V |
| C45 | 1-161-379-00 | s | CERAMIC 0.01uF 20% 25V |
| C46 | 1-126-157-11 | s | ELECT 10uF 20% 16V |
| C47 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C48 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C49 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C51 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C53 | 1-126-160-11 | s | ELECT 1uF 20% 50V |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

(DR-187 BOARD(BFC-1))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| C55 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C57 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C59 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C61 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C63 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C65 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C66 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C67 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C68 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C69 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C70 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C71 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C72 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C73 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C74 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C75 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C76 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C77 | 1-161-051-00 | s | CERAMIC 0.01uF 10% 50V |
| C78 | 1-126-977-11 | s | ELECT 2200uF 20% 50V |
| C79 | 1-161-051-00 | s | CERAMIC 0.01uF 10% 50V |
| C80 | 1-126-977-11 | s | ELECT 2200uF 20% 50V |
| C81 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C82 | 1-161-051-00 | s | CERAMIC 0.01uF 10% 50V |
| C83 | 1-126-977-11 | s | ELECT 2200uF 20% 50V |
| C84 | 1-161-051-00 | s | CERAMIC 0.01uF 10% 50V |
| C85 | 1-126-977-11 | s | ELECT 2200uF 20% 50V |
| C86 | 1-136-205-11 | s | FILM 0.022uF 5% 630V |
| C87 | 1-136-205-11 | s | FILM 0.022uF 5% 630V |
| C88 | 1-131-345-00 | s | ELECT 0.47uF 10% 35V |
| C89 | 1-137-484-11 | s | FILM 0.47uF 5% 630V |
| C90 | 1-137-484-11 | s | FILM 0.47uF 5% 630V |
| C91 | 1-136-205-11 | s | FILM 0.022uF 5% 630V |
| C92 | 1-136-205-11 | s | FILM 0.022uF 5% 630V |
| C93 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C94 | 1-161-051-00 | s | CERAMIC 0.01uF 10% 50V |
| C95 | 1-126-977-11 | s | ELECT 2200uF 20% 50V |
| C96 | 1-161-051-00 | s | CERAMIC 0.01uF 10% 50V |
| C97 | 1-126-977-11 | s | ELECT 2200uF 20% 50V |
| C98 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C99 | 1-161-051-00 | s | CERAMIC 0.01uF 10% 50V |
| C100 | 1-126-977-11 | s | ELECT 2200uF 20% 50V |
| C101 | 1-161-051-00 | s | CERAMIC 0.01uF 10% 50V |
| C102 | 1-126-977-11 | s | ELECT 2200uF 20% 50V |
| C103 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C104 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C105 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C106 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C107 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C108 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C109 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C110 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C111 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C112 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C113 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C114 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C115 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C116 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C117 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C118 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

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| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| C119 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C120 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C121 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C122 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C123 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C124 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C127 | 1-125-515-11 | s | ELECT 10000uF 20% 100V |
| C128 | 1-162-289-31 | s | CERAMIC 390pF 10% 50V |
| C129 | 1-162-289-31 | s | CERAMIC 390pF 10% 50V |
| C130 | 1-162-289-31 | s | CERAMIC 390pF 10% 50V |
| C131 | 1-126-977-11 | s | ELECT 2200uF 20% 50V |
| C132 | 1-124-122-11 | s | ELECT 100uF 20% 50V |
| C133 | 1-124-122-11 | s | ELECT 100uF 20% 50V |
| C134 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C135 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C136 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C137 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C138 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C139 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C140 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C141 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C142 | 1-136-203-11 | s | FILM 0.01uF 5% 630V |
| C143 | 1-136-203-11 | s | FILM 0.01uF 5% 630V |
| C144 | 1-136-203-11 | s | FILM 0.01uF 5% 630V |
| C145 | 1-136-203-11 | s | FILM 0.01uF 5% 630V |
| C146 | 1-136-203-11 | s | FILM 0.01uF 5% 630V |
| C147 | 1-136-203-11 | s | FILM 0.01uF 5% 630V |
| C148 | 1-136-203-11 | s | FILM 0.01uF 5% 630V |
| C149 | 1-136-203-11 | s | FILM 0.01uF 5% 630V |
| C150 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C151 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C152 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C153 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C154 | 1-124-122-11 | s | ELECT 100uF 20% 50V |
| C155 | 1-124-122-11 | s | ELECT 100uF 20% 50V |
| C156 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C157 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C158 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C159 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C160 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C161 | 1-126-157-11 | s | ELECT 10uF 20% 16V |
| C162 | 1-161-379-00 | s | CERAMIC 0.01uF 20% 25V |
| C163 | 1-126-160-11 | s | ELECT 1uF 20% 50V |
| C164 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C165 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C166 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C167 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C168 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C169 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C170 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C171 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C172 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C173 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C174 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| CN1 | 1-568-144-11 | o | CONNECTOR, DIN 96P, MALE |
| CN2 | 1-506-702-11 | o | CONNECTOR, ILG 3P, MALE |
| CN3 | 1-560-752-00 | o | CONNECTOR, 9P, MALE |
| CN4 | 1-560-178-00 | o | CONNECTOR, 6P, MALE |
| CN5 | 1-560-177-00 | o | CONNECTOR, 4P, MALE |

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| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| CN6 | 1-506-702-11 | o | CONNECTOR, ILG 3P, MALE |
| CN7 | 1-506-362-00 | o | CONNECTOR, ILG 10P, MALE |
| D1 | 8-719-820-12 | s | LED TLR224, RED |
| D2 | 8-719-820-12 | s | LED TLR224, RED |
| D3 | 8-719-820-12 | s | LED TLR224, RED |
| D4 | 8-719-820-12 | s | LED TLR224, RED |
| D5 | 8-719-820-12 | s | LED TLR224, RED |
| D6 | 8-719-820-12 | s | LED TLR224, RED |
| D7 | 8-719-820-12 | s | LED TLR224, RED |
| D8 | 8-719-812-43 | s | LED TLG124A, GRN |
| D9 | 8-719-980-78 | s | DIODE ERA81-004 |
| D10 | 8-719-980-78 | s | DIODE ERA81-004 |
| D11 | 8-719-980-78 | s | DIODE ERA81-004 |
| D12 | 8-719-980-78 | s | DIODE ERA81-004 |
| D13 | 8-719-980-78 | s | DIODE ERA81-004 |
| D14 | 8-719-980-78 | s | DIODE ERA81-004 |
| D15 | 8-719-980-78 | s | DIODE ERA81-004 |
| D16 | 8-719-980-78 | s | DIODE ERA81-004 |
| D17 | 8-719-980-78 | s | DIODE ERA81-004 |
| D18 | 8-719-821-38 | s | LED TLG224, GRN |
| D19 | 8-719-911-19 | s | DIODE 1SS119 |
| D20 | 8-719-980-78 | s | DIODE ERA81-004 |
| D21 | 8-719-980-78 | s | DIODE ERA81-004 |
| D22 | 8-719-911-19 | s | DIODE 1SS119 |
| D23 | 8-719-911-19 | s | DIODE 1SS119 |
| D24 | 8-719-911-19 | s | DIODE 1SS119 |
| D25 | 8-719-911-19 | s | DIODE 1SS119 |
| D26 | 8-719-980-78 | s | DIODE ERA81-004 |
| D27 | 8-719-911-19 | s | DIODE 1SS119 |
| D28 | 8-719-911-19 | s | DIODE 1SS119 |
| D29 | 8-719-821-38 | s | LED TLG224, GRN |
| D30 | 8-719-911-19 | s | DIODE 1SS119 |
| D31 | 8-719-911-19 | s | DIODE 1SS119 |
| D32 | 8-719-109-72 | s | DIODE RD3.9ES-B2 |
| D33 | 8-719-821-38 | s | LED TLG224, GRN |
| D34 | 8-719-911-19 | s | DIODE 1SS119 |
| D35 | 8-719-911-19 | s | DIODE 1SS119 |
| D36 | 8-719-911-19 | s | DIODE 1SS119 |
| D37 | 8-719-911-19 | s | DIODE 1SS119 |
| D38 | 8-719-821-38 | s | LED TLG224, GRN |
| D39 | 8-719-980-78 | s | DIODE ERA81-004 |
| D40 | 8-719-911-19 | s | DIODE 1SS119 |
| D41 | 8-719-980-78 | s | DIODE ERA81-004 |
| D42 | 8-719-109-72 | s | DIODE RD3.9ES-B2 |
| D43 | 8-719-911-19 | s | DIODE 1SS119 |
| D44 | 8-719-911-19 | s | DIODE 1SS119 |
| D45 | 8-719-980-78 | s | DIODE ERA81-004 |
| D46 | 8-719-980-78 | s | DIODE ERA81-004 |
| D47 | 8-719-980-78 | s | DIODE ERA81-004 |
| D48 | 8-719-980-78 | s | DIODE ERA81-004 |
| D49 | 8-719-980-78 | s | DIODE ERA81-004 |
| D50 | 8-719-980-78 | s | DIODE ERA81-004 |
| D51 | 8-719-980-78 | s | DIODE ERA81-004 |
| D52 | 8-719-980-78 | s | DIODE ERA81-004 |
| D53 | 8-719-980-78 | s | DIODE ERA81-004 |
| D54 | 8-719-980-78 | s | DIODE ERA81-004 |
| D55 | 8-719-911-19 | s | DIODE 1SS119 |
| D56 | 8-719-911-19 | s | DIODE 1SS119 |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

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| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| D57 | 8-719-110-49 | s | DIODE RD18ES-B2 |
| D58 | 8-719-110-49 | s | DIODE RD18ES-B2 |
| D59 | 8-719-200-77 | s | DIODE 10E2N |
| D60 | 8-719-200-77 | s | DIODE 10E2N |
| D61 | 8-719-110-49 | s | DIODE RD18ES-B2 |
| D62 | 8-719-110-49 | s | DIODE RD18ES-B2 |
| D63 | 8-719-200-77 | s | DIODE 10E2N |
| D64 | 8-719-200-77 | s | DIODE 10E2N |
| D65 | 8-719-980-78 | s | DIODE ERA81-004 |
| D66 | 8-719-980-78 | s | DIODE ERA81-004 |
| D67 | 8-719-110-49 | s | DIODE RD18ES-B2 |
| D68 | 8-719-110-49 | s | DIODE RD18ES-B2 |
| D69 | 8-719-200-77 | s | DIODE 10E2N |
| D70 | 8-719-200-77 | s | DIODE 10E2N |
| D71 | 8-719-110-49 | s | DIODE RD18ES-B2 |
| D72 | 8-719-110-49 | s | DIODE RD18ES-B2 |
| D73 | 8-719-200-77 | s | DIODE 10E2N |
| D74 | 8-719-200-77 | s | DIODE 10E2N |
| D77 | 8-719-980-78 | s | DIODE ERA83-006 |
| D78 | 8-719-109-81 | s | DIODE RD4, 7ES-B2 |
| D79 | 8-719-820-12 | s | DIODE TLR224 |
| IC1 | 8-759-045-38 | s | IC MC14538BCP |
| IC2 | 8-759-729-03 | s | IC NJM2903D |
| IC3 | 8-759-916-16 | s | IC MC74HC08AN |
| IC4 | 8-759-729-03 | s | IC NJM2903D |
| IC5 | 8-759-045-38 | s | IC MC14538BCP |
| IC6 | 8-759-916-71 | s | IC SN74HC244N |
| IC7 | 8-759-241-02 | s | IC TC74HC191AP |
| IC8 | 8-759-032-81 | s | IC MC74HC74AN |
| IC9 | 8-759-241-02 | s | IC TC74HC191AP |
| IC10 | 8-759-241-02 | s | IC TC74HC191AP |
| IC11 | 8-759-916-79 | s | IC SN74HC273N |
| IC12 | 8-759-946-63 | s | IC SN74ALS541N |
| IC13 | 8-759-241-02 | s | IC TC74HC191AP |
| IC14 | 8-759-729-03 | s | IC NSM2903D |
| IC15 | 8-759-241-02 | s | IC TC74HC191AP |
| IC16 | 8-759-241-02 | s | IC TC74HC191AP |
| IC17 | 8-759-916-79 | s | IC SN74HC273N |
| IC18 | 8-759-946-63 | s | IC SN74ALS541N |
| IC19 | 8-759-916-22 | s | IC SN74HC21N |
| IC20 | 8-759-946-63 | s | IC SN74ALS541N |
| IC21 | 8-759-916-20 | s | IC SN74HC14N |
| IC22 | 8-759-916-16 | s | IC MC74HC08AN |
| IC23 | 8-759-916-22 | s | IC SN74HC21N |
| IC24 | 8-759-916-14 | s | IC SN74HC04N |
| IC25 | 8-759-916-19 | s | IC SN74HC11N |
| IC26 | 8-759-916-14 | s | IC SN74HC04N |
| IC27 | 8-759-916-19 | s | IC SN74HC11N |
| IC29 | 8-719-902-56 | s | IC PC817 |
| IC30 | 8-759-916-14 | s | IC SN74HC04N |
| IC31 | 8-759-916-14 | s | IC SN74HC04N |
| IC32 | 8-759-916-14 | s | IC SN74HC04N |
| IC33 | 8-759-916-20 | s | IC SN74HC14N |
| IC34 | 8-759-921-10 | s | IC SN74HC86AN |
| IC35 | 8-759-916-22 | s | IC SN74HC21AN |
| PC1 | 8-749-924-01 | s | PHOTO COUPLER PC923 |
| PC2 | 8-749-924-01 | s | PHOTO COUPLER PC923 |
| PC3 | 8-749-924-01 | s | PHOTO COUPLER PC923 |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

(DR-187 BOARD(BFC-1))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| PC4 | 8-749-924-01 | s | PHOTO COUPLER PC923 |
| PS1 | ⚠ 1-532-686-21 | s | LINK, IC 2.7A |
| Q1 | 8-729-140-22 | s | TRANSISTOR 2SA1444-K |
| Q2 | 8-729-140-22 | s | TRANSISTOR 2SA1444-K |
| Q3 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q4 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q5 | 8-729-140-22 | s | TRANSISTOR 2SA1444-K |
| Q6 | 8-729-140-22 | s | TRANSISTOR 2SA1444-K |
| Q7 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q8 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q9 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q10 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q11 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q12 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q13 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q14 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q15 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q16 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q17 | 8-729-119-78 | s | TRANSISTOR 2SC2785-HFE |
| Q21 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q22 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q23 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q24 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q25 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q26 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q27 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q28 | 8-729-803-82 | s | TRANSISTOR 2SC3468-E |
| Q29 | 8-729-140-22 | s | TRANSISTOR 2SA1444-K |
| Q30 | 8-729-140-22 | s | TRANSISTOR 2SA1444-K |
| Q31 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q32 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q33 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q34 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q35 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q36 | 8-729-015-08 | s | TRANSISTOR 2SA1077-X |
| Q38 | 8-729-119-78 | s | TRANSISTOR 2SC2785-HFE |
| Q39 | 8-729-119-78 | s | TRANSISTOR 2SC2785-HFE |
| Q40 | 8-729-015-42 | s | TRANSISTOR IRFI540 |
| Q41 | 8-729-015-42 | s | TRANSISTOR IRFI540 |
| Q42 | 8-729-015-42 | s | TRANSISTOR IRFI540 |
| Q43 | 8-729-015-42 | s | TRANSISTOR IRFI540 |
| Q44 | 8-729-015-42 | s | TRANSISTOR IRFI540 |
| Q45 | 8-729-015-42 | s | TRANSISTOR IRFI540 |
| Q46 | 8-729-015-42 | s | TRANSISTOR IRFI540 |
| Q47 | 8-729-015-42 | s | TRANSISTOR IRFI540 |
| Q48 | 8-729-119-78 | s | TRANSISTOR 2SC2785-HFE |
| Q49 | 8-729-119-78 | s | TRANSISTOR 2SC2785-HFE |
| R1 | ⚠ 1-207-620-00 | s | WIREWOUND 1 10% 3W |
| R2 | ⚠ 1-207-620-00 | s | WIREWOUND 1 10% 3W |
| R3 | ⚠ 1-207-620-00 | s | WIREWOUND 1 10% 3W |
| R4 | ⚠ 1-207-620-00 | s | WIREWOUND 1 10% 3W |
| R13 | ⚠ 1-215-894-11 | s | METAL 2.2k 5% 2W |
| R14 | ⚠ 1-215-894-11 | s | METAL 2.2k 5% 2W |
| R15 | ⚠ 1-215-889-00 | s | METAL 330 5% 2W |
| R16 | ⚠ 1-215-889-00 | s | METAL 330 5% 2W |
| R17 | ⚠ 1-215-894-11 | s | METAL 2.2k 5% 2W |
| R18 | ⚠ 1-215-894-11 | s | METAL 2.2k 5% 2W |

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

(DR-187 BOARD(BFC-1))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| R19 | ⚠ 1-215-889-00 | s | METAL 330 5% 2W |
| R20 | ⚠ 1-215-889-00 | s | METAL 330 5% 2W |
| R23 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R36 | 1-215-406-00 | s | METAL 240 1% 1/6W |
| R38 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R39 | 1-247-899-11 | s | CARBON 680k 5% 1/4W |
| R40 | 1-247-899-11 | s | CARBON 680k 5% 1/4W |
| R41 | 1-247-899-11 | s | CARBON 680k 5% 1/4W |
| R42 | 1-247-899-11 | s | CARBON 680k 5% 1/4W |
| R45 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R46 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R51 | 1-247-903-00 | s | CARBON 1M 5% 1/4W |
| R60 | 1-215-424-00 | s | METAL 1.3k 1% 1/6W |
| R61 | 1-215-425-00 | s | METAL 1.5k 1% 1/6W |
| R63 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R64 | ⚠ 1-215-894-11 | s | METAL 2.2k 5% 2W |
| R65 | ⚠ 1-215-894-11 | s | METAL 2.2k 5% 2W |
| R66 | ⚠ 1-215-889-00 | s | METAL 330 5% 2W |
| R67 | ⚠ 1-215-889-00 | s | METAL 330 5% 2W |
| R68 | ⚠ 1-215-891-11 | s | METAL 680 5% 2W |
| R69 | ⚠ 1-215-891-11 | s | METAL 680 5% 2W |
| R70 | ⚠ 1-215-889-00 | s | METAL 330 5% 2W |
| R71 | ⚠ 1-215-889-00 | s | METAL 330 5% 2W |
| R80 | ⚠ 1-207-620-00 | s | WIREWOUND 1 10% 3W |
| R81 | ⚠ 1-207-620-00 | s | WIREWOUND 1 10% 3W |
| R82 | ⚠ 1-207-620-00 | s | WIREWOUND 1 10% 3W |
| R83 | ⚠ 1-207-620-00 | s | WIREWOUND 1 10% 3W |
| R137 | ⚠ 1-207-678-00 | s | WIREWOUND 10 10% 6W |
| R166 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R167 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R169 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R171 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R172 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R176 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R178 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R179 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R185 | 1-215-409-00 | s | METAL 330 1% 1/6W |
| R186 | 1-215-426-00 | s | METAL 1.6k 1% 1/6W |
| R187 | 1-215-406-00 | s | METAL 240 1% 1/6W |
| R192 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R193 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| R194 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| RY1 | 1-515-979-11 | s | RELAY (POWER) |
| RY2 | 1-515-979-11 | s | RELAY |
| RY3 | 1-515-979-11 | s | RELAY |
| SW1 | ⚠ 1-533-407-11 | s | BREAKER, CIRCUIT 1.6A 250V |
| SW2 | ⚠ 1-533-407-11 | s | BREAKER, CIRCUIT 1.6A 250V |
| SW3 | ⚠ 1-533-407-11 | s | BREAKER, CIRCUIT 1.6A 250V |
| SW4 | ⚠ 1-533-407-11 | s | BREAKER, CIRCUIT 1.6A 250V |

## EX-362 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8276-527-A | o | MOUNTED CIRCUIT BOARD, EX-362 |
| 8pcs | 7-628-254-30 | s | SCREW +PS 2.6X10 |
| 8pcs | 7-622-207-05 | s | N 2.6, TYPE 2 |
| C1 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C2 | 1-162-179-11 | s | CERAMIC 0.1uF 50V |
| CN1 | 1-563-341-11 | o | CONNECTOR, DIN 96P, FEMALE |
| CN2 | 1-563-339-11 | o | CONNECTOR, DIN 48P, FEMALE |
| CN3 | 1-506-748-11 | s | CONNECTOR, DIN 96P, MALE |
| CN4 | 1-506-746-11 | s | CONNECTOR, DIN 48P, MALE |
| D1 | 8-719-920-05 | s | DIODE SLP281C-50 |

## IF-373 BOARD(BFC-1, BKFC-100)

Two IF-373 boards are used in this cart machine. This board can be purchased as BKFC-100. (BKFC-100 has one IF-373 board) One board has the following parts.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| # 1pc | 3-178-855-03 | o | PANEL (IF-373), CONNECTOR |
| # 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| 8pcs | 7-682-903-31 | s | SCREW +PWH 3X10 |
| # 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| # 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| C1 | 1-162-207-31 | s | CERAMIC 22pF 5% 50V |
| C2 | 1-162-207-31 | s | CERAMIC 22pF 5% 50V |
| C3 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C4 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C5 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C6 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C7 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C8 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C9 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C10 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C11 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C12 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C13 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C14 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C15 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C16 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C17 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C18 | 1-124-589-11 | s | ELECT 47uF 20% 16V |
| C19 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C20 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C21 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C22 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C23 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C24 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C25 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C26 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C27 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C28 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C29 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C30 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C31 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| CN1 | 1-568-144-11 | o | CONNECTOR, DIN 96P, MALE |
| CN2 | 1-563-323-11 | s | CONNECTOR, D-SUB 9P, FEMALE |
| CN3 | 1-563-323-11 | s | CONNECTOR, D-SUB 9P, FEMALE |
| CN4 | 1-563-323-11 | s | CONNECTOR, D-SUB 9P, FEMALE |
| CN5 | 1-563-323-11 | s | CONNECTOR, D-SUB 9P, FEMALE |
| D1 | 8-719-920-05 | s | DIODE SLP281C-50 |
| D2 | 8-719-820-12 | s | LED TLR224, RED |
| IC1 | 8-759-904-76 | s | IC AM26LS31CN |
| IC2 | 8-759-916-41 | s | IC SN74HC126N |
| IC3 | 8-759-916-41 | s | IC SN74HC126N |
| IC4 | 8-759-904-77 | s | IC AM26LS32ACN |
| IC5 | 8-759-916-79 | s | IC SN74HC273N |
| IC6 | 8-759-916-14 | s | IC SN74HC04N |
| IC7 | 8-759-323-91 | s | IC HD64180ZP8 |
| IC8 | 8-759-904-83 | s | IC 74F32PC |
| IC9 | 8-759-904-46 | s | IC SN74ALS38AN |
| # IC11 | 8-759-270-94 | o | IC 27C256-IF373V120, EPROM |
| IC12 | 8-759-916-46 | s | IC SN74HC139N |

(IF-373 BOARD(BFC-1, BKFC-100))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| IC13 | 8-759-156-29 | s | IC LH5168-10TL |
| IC14 | 8-759-916-14 | s | IC SN74HC04N |
| IC15 | 8-759-947-36 | s | IC MB8422-90LP |
| IC16 | 8-759-917-05 | s | IC SN74HC541N |
| IC17 | 8-759-916-96 | s | IC SN74HC374N |
| IC18 | 8-759-916-96 | s | IC SN74HC374N |
| IC19 | 8-759-914-96 | s | IC N74F85N |
| IC20 | 8-759-946-63 | s | IC SN74ALS541N |
| IC21 | 8-759-946-63 | s | IC SN74ALS541N |
| IC22 | 8-759-912-21 | s | IC SN74ALS245AN |
| IC23 | 8-759-946-63 | s | IC SN74ALS541N |
| ICA11 | 1-526-659-00 | o | SOCKET, IC 28P |
| ND1 | 8-719-901-68 | s | LED GL-6R202, RED |
| PS1 | ⚠ 1-532-686-21 | s | LINK, IC 2.7A |
| S1 | 1-554-303-21 | s | SWITCH, TACTILE |
| S2 | 1-554-303-21 | s | SWITCH, TACTILE |
| S3 | 1-570-623-11 | s | SWITCH, DIP 8-CKT |
| X1 | 1-567-812-11 | s | RESONATOR, CERAMIC 12.288MHz |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

## IF-401 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| # 1pc | A-8271-769-B | o | MOUNTED CIRCUIT BOARD, IF-401 |
| # 2pcs | 3-172-089-01 | o | HANDLE |
| # 1pc | 3-178-847-02 | o | PANEL (IF-401), CONNECTOR |
| # 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| # 2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| # 2pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| # 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| # 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| C1 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| C2 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C3 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C4 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C5 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C6 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| C7 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C8 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C9 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C10 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C11 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C12 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C13 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C14 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C15 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C16 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C17 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C18 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C19 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C20 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C21 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C22 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C23 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C24 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C25 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C26 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C27 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C28 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C29 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C30 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C31 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C32 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C33 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C34 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C35 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C36 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C37 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C38 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C39 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C40 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C41 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C42 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C43 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C44 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C45 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C46 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C47 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C48 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C49 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C50 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

(IF-401 BOARD(BFC-1))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| C51 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C52 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C53 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C54 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C55 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C56 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C57 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C58 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C59 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C60 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C61 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C66 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C67 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C68 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C69 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C70 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C71 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C72 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C73 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C74 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C75 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C76 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C77 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C78 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C79 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| # C80 | 1-130-495-00 | s | ELECT 0.1uF |
| CN1 | 1-568-144-11 | o | CONNECTOR, DIN 96P, MALE |
| CN2 | 1-569-465-11 | o | CONNECTOR, DIN 48P, MALE |
| D1 | 8-719-920-05 | s | DIODE SLP281C-50 |
| # DB1 | 8-759-518-61 | s | IC SN74S1057SC |
| # DB2 | 8-759-518-61 | s | IC SN74S1057SC |
| # DB3 | 8-759-518-61 | s | IC SN74S1057SC |
| IC1 | 8-759-904-77 | s | IC AM26LS32ACN |
| IC2 | 8-759-904-77 | s | IC AM26LS32ACN |
| IC3 | 8-759-916-14 | s | IC SN74HC04N |
| # IC4 | 8-759-273-24 | s | IC CX23028A |
| # IC5 | 8-759-273-24 | s | IC CX23028A |
| IC6 | 8-759-916-14 | s | IC SN74HC04N |
| IC7 | 8-759-916-12 | s | IC SN74HC00N |
| IC8 | 8-759-916-12 | s | IC SN74HC00N |
| IC9 | 8-759-916-16 | s | IC MC74HC08AN |
| IC10 | 8-759-916-16 | s | IC MC74HC08AN |
| IC11 | 8-752-806-91 | s | IC CXQ71054P |
| IC12 | 8-752-806-91 | s | IC CXQ71054P |
| IC13 | 8-752-806-91 | s | IC CXQ71054P |
| IC14 | 8-759-916-79 | s | IC SN74HC273N |
| IC15 | 8-759-032-81 | s | IC MC74HC74AN |
| IC16 | 8-759-032-81 | s | IC MC74HC74AN |
| IC17 | 8-759-032-81 | s | IC MC74HC74AN |
| IC18 | 8-759-032-81 | s | IC MC74HC74AN |
| IC19 | 8-759-916-71 | s | IC SN74HC244N |
| IC20 | 8-759-916-19 | s | IC SN74HC11N |
| IC21 | 8-759-916-25 | s | IC SN74HC32N |
| IC22 | 8-759-921-22 | s | IC SN74HC164N |
| IC23 | 8-759-921-22 | s | IC SN74HC164N |
| IC24 | 8-759-914-03 | s | IC SN74LS06N |
| IC25 | 8-759-032-81 | s | IC MC74HC74AN |

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

(IF-401 BOARD(BFC-1))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| IC26 | 8-759-916-79 | s | IC SN74HC273N |
| IC27 | 8-759-916-79 | s | IC SN74HC273N |
| IC28 | 8-759-916-79 | s | IC SN74HC273N |
| IC29 | 8-759-241-02 | s | IC TC74HC191AP |
| IC30 | 8-759-241-02 | s | IC TC74HC191AP |
| IC31 | 8-759-241-02 | s | IC TC74HC191AP |
| IC32 | 8-759-241-02 | s | IC TC74HC191AP |
| IC33 | 8-759-917-43 | s | IC SN74HC138N |
| IC34 | 8-759-917-43 | s | IC SN74HC138N |
| IC35 | 8-759-916-16 | s | IC MC74HC08AN |
| IC36 | 8-759-902-92 | s | IC SN74LS541N |
| IC37 | 8-759-902-92 | s | IC SN74LS541N |
| IC38 | 8-759-902-45 | s | IC SN74LS245N |
| IC39 | 8-759-902-92 | s | IC SN74LS541N |
| IC40 | 8-759-902-45 | s | IC SN74LS245N |
| IC41 | 8-759-921-99 | s | IC SN74HCT541N |
| IC42 | 8-759-902-92 | s | IC SN74LS541N |
| IC43 | 8-759-921-99 | s | IC SN74HCT541N |
| IC44 | 8-759-946-63 | s | IC SN74ALS541N |
| IC45 | 8-759-902-92 | s | IC SN74LS541N |
| # IC46 | 8-759-239-47 | s | IC TC74HC123AP |
| PS1 | ⚠ 1-532-686-21 | s | LINK, IC 2.7A |
| R2 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R5 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R8 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R12 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R15 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R18 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R21 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R49 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R50 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R51 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R52 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R53 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R54 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R55 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R56 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R57 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| R58 | 1-247-807-31 | s | CARBON 100 5% 1/4W |
| # R73 | 1-247-887-00 | s | CARBON 220k 5% 1/4W |
| RB1 | 1-231-401-00 | s | RESISTOR BLOCK 470x8 |
| RB2 | 1-231-405-00 | s | RESISTOR BLOCK 1kx8 |
| # RB3 | 1-235-710-11 | s | RESISTOR BLOCK 680x8 |
| # RB4 | 1-235-705-11 | s | RESISTOR BLOCK 270x8 |
| # RB5 | 1-235-710-11 | s | RESISTOR BLOCK 680x8 |
| # RB6 | 1-235-705-11 | s | RESISTOR BLOCK 270x8 |
| # RB7 | 1-235-713-11 | s | RESISTOR BLOCK 1.2kx8 |
| # RB8 | 1-231-401-00 | s | RESISTOR BLOCK 470x8 |

MB-431 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8276-519-A | o | MOUNTED CIRCUIT BOARD, MB-431 |
| 26pcs | 7-621-770-XX | s | SCREW +P2.6X8 |
| # 2pcs | 7-682-902-51 | s | SCREW +PWH 2.6X12 |
| # 28pcs | 7-622-207-05 | s | N 2.6, TYPE 2 |
| C1 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C2 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C3 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C4 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C5 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C6 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C7 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C8 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| CN1 | 1-563-335-11 | s | CONNECTOR, DIN 48P, FEMALE |
| CN2 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN3 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN4 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN5 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN6 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN7 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN8 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN9 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN10 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN11 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN12 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN13 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| CN14 | 1-506-700-11 | o | HEADER 34P, MALE |
| CN15 | 1-560-752-00 | o | CONNECTOR, 9P, MALE |
| CN16 | 1-506-706-11 | o | CONNECTOR, ILG 8P, MALE |
| CN17 | 1-750-207-11 | o | HEADER 40P, MALE |
| CN18 | 1-506-694-11 | o | HEADER 26P, MALE |
| CN19 | 1-506-700-11 | o | HEADER 34P, MALE |
| CN20 | 1-563-337-11 | s | CONNECTOR, DIN 96P, FEMALE |
| # R5 | 1-247-855-31 | s | CARBON (SMALL) 10k 5% 1/4W |
| RB1 | 1-235-714-11 | s | RESISTOR BLOCK 1.5kx8 |
| RB2 | 1-235-715-11 | s | RESISTOR BLOCK 1.8kx8 |
| RB3 | 1-235-711-11 | s | RESISTOR BLOCK 820x8 |
| RB4 | 1-235-713-11 | s | RESISTOR BLOCK 1.2kx8 |
| RB5 | 1-235-711-11 | s | RESISTOR BLOCK 820x8 |
| RB6 | 1-235-713-11 | s | RESISTOR BLOCK 1.2kx8 |
| RB7 | 1-235-711-11 | s | RESISTOR BLOCK 820x8 |
| RB8 | 1-235-713-11 | s | RESISTOR BLOCK 1.2kx8 |
| RB9 | 1-235-711-11 | s | RESISTOR BLOCK 820x8 |
| RB10 | 1-235-713-11 | s | RESISTOR BLOCK 1.2kx8 |
| RB11 | 1-235-711-11 | s | RESISTOR BLOCK 820x8 |
| RB12 | 1-235-713-11 | s | RESISTOR BLOCK 1.2kx8 |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

## MT-65 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 3pcs | 1-632-546-11 | o | PRINTED CIRCUIT BOARD, MT-65 |

Three MT-65 boards are used in this cart machine.
One board has the following parts.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| C1 | 1-124-584-00 | s | ELECT 100uF 20% 10V |
| CN1 | 1-508-900-00 | s | CONNECTOR (M) 2P |

## PS-330 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| # 1pc | A-8271-862-B | o | MOUNTED CIRCUIT BOARD, PS-330 |
| 3pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| # 4pcs | 4-026-252-00 | s | WASHER, INSULATING |
| # 2pcs | 4-857-833-00 | s | INSULATOR, 03P |
| # 4pcs | 7-682-548-04 | s | SCREW +B 3X8 |
| # 4pcs | 7-682-950-01 | s | SCREW +PSW 3X12 |
| # 6pcs | 7-683-405-04 | s | BOLT, HEXAGON SOCKET 3X10 |
| # 6pcs | 7-688-003-11 | s | WASHER 3, MIDDLE |
| 7pcs | 4-812-134-11 | s | RIVET NYLON, 3.5 |
| C1 | 1-161-327-00 | s | CERAMIC 0.0033uF 30% 16V |
| C2 | 1-161-379-00 | s | CERAMIC 0.01uF 20% 25V |
| C3 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C4 | 1-126-953-11 | s | ELECT 2200uF 20% 35V |
| C5 | 1-126-953-11 | s | ELECT 2200uF 20% 35V |
| C6 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C7 | 1-130-499-00 | s | MYLAR 0.22uF 5% 50V |
| C8 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C9 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C10 | 1-130-499-00 | s | MYLAR 0.22uF 5% 50V |
| # C11 | 1-124-915-11 | s | ELECT 10uF 20% 63V |
| C12 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C13 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C14 | 1-161-375-00 | s | CERAMIC 0.0022uF 20% 50V |
| C15 | 1-161-375-00 | s | CERAMIC 0.0022uF 20% 50V |
| # C16 | 1-126-936-11 | s | ELECT 3300uF 20% 16V |
| C17 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C18 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C19 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C20 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C21 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C22 | 1-161-379-00 | s | CERAMIC 0.01uF 20% 25V |
| # C23 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C24 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C25 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C26 | 1-130-499-00 | s | MYLAR 0.22uF 5% 50V |
| C27 | 1-130-489-00 | s | MYLAR 0.033uF 5% 50V |
| # C28 | 1-124-915-11 | s | ELECT 10uF 20% 63V |
| # C29 | 1-124-915-11 | s | ELECT 10uF 20% 63V |
| C30 | 1-126-972-11 | s | ELECT 1000uF 20% 50V |
| C31 | 1-136-502-11 | s | MYLAR 0.33uF 5% 50V |
| C32 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C33 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C34 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| C35 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| C36 | 1-125-515-11 | s | ELECT 10000uF 20% 100V |
| C37 | 1-125-515-11 | s | ELECT 10000uF 20% 100V |
| C38 | 1-125-515-11 | s | ELECT 10000uF 20% 100V |
| C39 | 1-125-515-11 | s | ELECT 10000uF 20% 100V |
| C40 | 1-125-515-11 | s | ELECT 10000uF 20% 100V |
| C41 | 1-125-515-11 | s | ELECT 10000uF 20% 100V |
| C42 | 1-136-203-11 | s | FILM 0.01uF 10% 630V |
| CN1 | 1-560-752-00 | o | CONNECTOR, 9P, MALE |
| CN2 | 1-560-178-00 | o | CONNECTOR, 6P, MALE |
| CN3 | 1-560-752-00 | o | CONNECTOR, 9P, MALE |
| CN4 | 1-506-706-11 | o | CONNECTOR, ILG 8P, MALE |
| CN5 | 1-564-943-21 | o | CONNECTOR 12P, MALE |
| CN6 | 1-560-178-00 | o | CONNECTOR, 6P, MALE |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

### (SE-193 BOARD(BFC-1))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| Q3 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q4 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q5 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q6 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q7 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q8 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q9 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q10 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q11 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q12 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q13 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| R1 | 1-247-903-00 | s | CARBON 1M 5% 1/4W |
| X1 | 1-567-192-11 | s | RESONATOR, CERAMIC 4.00MHz |

### SE-195 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 2pcs | 1-646-805-11 | o | PRINTED CIRCUIT BOARD, SE-195 |

Two SE-196 boards are used in this cart machine.
One board has the following parts.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| CN1 | 1-506-484-11 | s | CONNECTOR, 5P, MALE |
| IC1 | 8-719-991-24 | s | PHOTO TRANSISTOR GP1S23 |
| IC2 | 8-719-991-24 | s | PHOTO TRANSISTOR GP1S23 |

### SE-196 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 3pcs | 1-646-806-11 | o | PRINTED CIRCUIT BOARD, SE-196 |

Three SE-196 boards are used in this cart machine.
One board has the following parts.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| CN1 | 1-564-013-11 | o | PIN, CONNECTOR 3P |
| IC1 | 8-719-941-80 | s | PHOTOINTERRUPTER GP1S53 |

### SE-197 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 3pcs | 1-646-807-12 | o | PRINTED CIRCUIT BOARD, SE-197 |

Four SE-197 boards are used in this cart machine.
One board has the following parts.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| CN1 | 1-564-013-11 | o | PIN, CONNECTOR 3P |
| IC1 | 8-719-991-24 | s | PHOTO TRANSISTOR GP1S23 |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

### SE-198 BOARD(BKFC-10B/10S)

One SE-198 board is used in BKFC-10B/10S.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8271-774-A | o | MOUNTED CIRCUIT BOARD, SE-198 |
| 4pcs | 7-682-902-51 | s | SCREW +PWH 2.6X12 |
| 4pcs | 7-622-207-05 | s | N 2.6, TYPE 2 |
| C1 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C2 | 1-126-923-11 | s | ELECT 220uF 20% 10V |
| C3 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C4 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C5 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C6 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C7 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C8 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C9 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C10 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C11 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C12 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C13 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C14 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C15 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C16 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C17 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C18 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C19 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C20 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C21 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C22 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C23 | 1-126-923-11 | s | ELECT 220uF 20% 10V |
| C24 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C25 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C26 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C27 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C28 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| CN1 | 1-564-391-11 | o | HEADER 40P, MALE |
| CN2 | 1-506-693-11 | o | HEADER 20P, MALE |
| D1 | 8-719-921-01 | s | LED EBR5534S, RED |
| D2 | 8-719-921-01 | s | LED EBR5534S, RED |
| D3 | 8-719-921-01 | s | LED EBR5534S, RED |
| D4 | 8-719-921-01 | s | LED EBR5534S, RED |
| D5 | 8-719-921-01 | s | LED EBR5534S, RED |
| DA1 | 3-730-315-01 | o | HOLDER, LED |
| DA2 | 3-730-315-01 | o | HOLDER, LED |
| DA3 | 3-730-315-01 | o | HOLDER, LED |
| DA4 | 3-730-315-01 | o | HOLDER, LED |
| DA5 | 3-730-315-01 | o | HOLDER, LED |
| IC1 | 8-759-902-45 | s | IC SN74LS245N |
| IC2 | 8-759-916-54 | s | IC SN74HC174N |
| IC3 | 8-759-917-43 | s | IC SN74HC138N |
| IC4 | 8-759-916-34 | s | IC SN74HC85BN |
| IC5 | 8-759-916-12 | s | IC SN74HC00N |
| IC6 | 8-759-902-44 | s | IC SN74LS244N |
| IC7 | 8-759-902-92 | s | IC SN74LS541N |
| IC8 | 8-759-916-25 | s | IC SN74HC32N |
| IC9 | 8-759-916-20 | s | IC SN74HC14N |
| IC10 | 8-759-916-20 | s | IC SN74HC14N |
| IC11 | 8-759-901-38 | s | IC SN74LS138N |
| IC12 | 8-759-916-54 | s | IC SN74HC174N |
| IC13 | 8-759-901-74 | s | IC SN74LS174N |

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

(SE-198 BOARD(BKFC-10B/10S))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| IC14 | 8-759-916-29 | s | IC SN74HC74N |
| IC15 | 8-759-916-92 | s | IC SN74HC367AN |
| IC16 | 8-759-916-54 | s | IC SN74HC174N |
| IC17 | 8-759-916-92 | s | IC SN74HC367AN |
| IC18 | 8-759-916-54 | s | IC SN74HC174N |
| IC19 | 8-759-916-54 | s | IC SN74HC174N |
| IC20 | 8-759-916-92 | s | IC SN74HC367AN |
| PS1 ⚠ | 1-532-686-21 | s | LINK, IC 2.7A |
| Q1 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q2 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q3 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q4 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q5 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q6 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q7 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q8 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q9 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q10 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q11 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q12 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q13 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q14 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q15 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q16 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q17 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q18 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q19 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q20 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q21 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q22 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q23 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q24 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q25 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| QA1 | 3-670-095-00 | o | HOLDER, LED |
| QA2 | 3-670-095-00 | o | HOLDER, LED |
| QA3 | 3-670-095-00 | o | HOLDER, LED |
| QA7 | 3-670-095-00 | o | HOLDER, LED |
| QA8 | 3-670-095-00 | o | HOLDER, LED |
| QA13 | 3-670-095-00 | o | HOLDER, LED |
| QA14 | 3-670-095-00 | o | HOLDER, LED |
| QA15 | 3-670-095-00 | o | HOLDER, LED |
| QA21 | 3-670-095-00 | o | HOLDER, LED |
| QA22 | 3-670-095-00 | o | HOLDER, LED |
| S1 | 1-554-027-00 | s | SWITCH, DIGITAL |

## SE-199 BOARD(BKFC-10B/10S)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8271-775-A | o | MOUNTED CIRCUIT BOARD, SE-199A |
| 1pc | A-8271-779-A | o | MOUNTED CIRCUIT BOARD, SE-199B |

SE-199A board is used in BKFC-10B, and SE-199B board is use in BKFC-10S. Each of these boards has the following parts.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 2pcs | 7-682-902-51 | s | SCREW +PWH 2.6X12 |
| 2pcs | 7-622-207-05 | s | N 2.6, TYPE 2 |
| C1 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C2 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C3 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C4 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C5 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C6 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C7 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C8 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C9 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C10 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C11 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C12 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C13 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C14 | 1-130-499-00 | s | MYLAR 0.22uF 5% 50V |
| C15 | 1-161-379-00 | s | CERAMIC 0.01uF 20% 25V |
| C16 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C17 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C18 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C19 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C20 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C21 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C22 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C23 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C24 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C25 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C26 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C27 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C28 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C29 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C30 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C31 | 1-126-923-11 | s | ELECT 220uF 20% 10V |
| # C32 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| CN1 | 1-506-693-11 | o | HEADER 20P, MALE |
| D1 | 8-719-157-80 | s | DIODE SE1003-C |
| D2 | 8-719-157-80 | s | DIODE SE1003-C |
| D3 | 8-719-157-80 | s | DIODE SE1003-C |
| D4 | 8-719-911-19 | s | DIODE 1SS119 |
| D5 | 8-719-911-19 | s | DIODE 1SS119 |
| D6 | 8-719-911-19 | s | DIODE 1SS119 |
| D7 | 8-719-157-80 | s | DIODE SE1003-C |
| D8 | 8-719-157-80 | s | DIODE SE1003-C |
| D9 | 8-719-911-19 | s | DIODE 1SS119 |
| D10 | 8-719-911-19 | s | DIODE 1SS119 |
| D11 | 8-719-157-80 | s | DIODE SE1003-C |
| D12 | 8-719-157-80 | s | DIODE SE1003-C |
| D13 | 8-719-157-80 | s | DIODE SE1003-C |
| D14 | 8-719-911-19 | s | DIODE 1SS119 |
| D15 | 8-719-911-19 | s | DIODE 1SS119 |
| D16 | 8-719-911-19 | s | DIODE 1SS119 |
| D17 | 8-719-921-01 | s | LED EBR5534S, RED |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

(SE-199 BOARD(BKFC-10B/10S))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| D18 | 8-719-157-80 | s | DIODE SE1003-C |
| D19 | 8-719-157-80 | s | DIODE SE1003-C |
| D20 | 8-719-911-19 | s | DIODE 1SS119 |
| D21 | 8-719-911-19 | s | DIODE 1SS119 |
| D22 | 8-719-921-01 | s | LED EBR5534S, RED |
| D23 | 8-719-921-01 | s | LED EBR5534S, RED |
| D24 | 8-719-921-01 | s | LED EBR5534S, RED |
| D25 | 8-719-921-01 | s | LED EBR5534S, RED |
| DA1 | 3-670-095-00 | o | HOLDER, LED |
| DA2 | 3-670-095-00 | o | HOLDER, LED |
| DA3 | 3-670-095-00 | o | HOLDER, LED |
| DA7 | 3-670-095-00 | o | HOLDER, LED |
| DA8 | 3-670-095-00 | o | HOLDER, LED |
| DA11 | 3-670-095-00 | o | HOLDER, LED |
| DA12 | 3-670-095-00 | o | HOLDER, LED |
| DA13 | 3-670-095-00 | o | HOLDER, LED |
| DA17 | 3-730-315-01 | o | HOLDER, LED |
| DA18 | 3-670-095-00 | o | HOLDER, LED |
| DA19 | 3-670-095-00 | o | HOLDER, LED |
| DA22 | 3-730-315-01 | o | HOLDER, LED |
| DA23 | 3-730-315-01 | o | HOLDER, LED |
| DA24 | 3-730-315-01 | o | HOLDER, LED |
| DA25 | 3-730-315-01 | o | HOLDER, LED |
| IC1 | 8-759-917-43 | s | IC SN74HC138N |
| IC2 | 8-759-991-02 | s | IC NE555P |
| IC3 | 8-759-232-68 | s | IC TC74HC160AP |
| IC4 | 8-759-901-25 | s | IC SN74LS125AN |
| Q1 | 8-729-900-61 | s | TRANSISTOR DTA114ES |
| Q2 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q3 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q4 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q5 | 8-729-900-61 | s | TRANSISTOR DTA114ES |
| Q6 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q7 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q8 | 8-729-900-61 | s | TRANSISTOR DTA114ES |
| Q9 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q10 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q11 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q12 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q13 | 8-729-900-61 | s | TRANSISTOR DTA114ES |
| Q14 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q15 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q16 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q17 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q18 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q19 | 8-729-900-74 | s | TRANSISTOR DTC143TS |

## SE-200 BOARD(BKFC-8D)

One SE-200 board is used in BKFC-8D.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8271-776-A | o | MOUNTED CIRCUIT BOARD, SE-200 |
| 2pcs | 7-682-902-51 | s | SCREW +PWH 2.6X12 |
| 2pcs | 7-622-207-05 | s | N 2.6, TYPE 2 |
| C1 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C2 | 1-126-923-11 | s | ELECT 220uF 20% 10V |
| C3 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C4 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C5 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C6 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C7 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C8 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C9 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C10 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C11 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C12 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C13 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C14 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C15 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C16 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C17 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C18 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C19 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C20 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C21 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C22 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C23 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C24 | 1-126-923-11 | s | ELECT 220uF 20% 10V |
| C25 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C26 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C27 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C28 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C29 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C30 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| C31 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| CN1 | 1-564-391-11 | o | HEADER 40P, MALE |
| CN2 | 1-506-693-11 | o | HEADER 20P, MALE |
| D1 | 8-719-921-01 | s | LED EBR5534S, RED |
| D2 | 8-719-921-01 | s | LED EBR5534S, RED |
| D3 | 8-719-921-01 | s | LED EBR5534S, RED |
| D4 | 8-719-921-01 | s | LED EBR5534S, RED |
| DA1 | 3-730-315-01 | o | HOLDER, LED |
| DA2 | 3-730-315-01 | o | HOLDER, LED |
| DA3 | 3-730-315-01 | o | HOLDER, LED |
| DA4 | 3-730-315-01 | o | HOLDER, LED |
| IC1 | 8-759-902-45 | s | IC SN74LS245N |
| IC2 | 8-759-916-54 | s | IC SN74HC174N |
| IC3 | 8-759-917-43 | s | IC SN74HC138N |
| IC4 | 8-759-916-34 | s | IC SN74HC85BN |
| IC5 | 8-759-916-12 | s | IC SN74HC00N |
| IC6 | 8-759-902-44 | s | IC SN74LS244N |
| IC7 | 8-759-902-92 | s | IC SN74LS541N |
| IC8 | 8-759-916-25 | s | IC SN74HC32N |
| IC9 | 8-759-916-20 | s | IC SN74HC14N |
| IC10 | 8-759-916-20 | s | IC SN74HC14N |
| IC11 | 8-759-916-29 | s | IC SN74HC74N |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

## (SE-200 BOARD(BKFC-8D))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| IC12 | 8-759-916-29 | s | IC SN74HC74N |
| IC13 | 8-759-901-38 | s | IC SN74LS138N |
| IC14 | 8-759-901-74 | s | IC SN74LS174N |
| IC15 | 8-759-916-71 | s | IC SN74HC244N |
| IC16 | 8-759-916-29 | s | IC SN74HC74N |
| IC17 | 8-759-916-29 | s | IC SN74HC74N |
| IC18 | 8-759-916-54 | s | IC SN74HC174N |
| IC19 | 8-759-916-71 | s | IC SN74HC244N |
| IC20 | 8-759-916-54 | s | IC SN74HC174N |
| IC21 | 8-759-916-54 | s | IC SN74HC174N |
| PS1 | ⚠ 1-532-686-21 | s | LINK, IC 2.7A |
| Q1 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q2 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q3 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q4 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q5 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q6 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q7 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q8 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q9 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q10 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q11 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q12 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q13 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q14 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q15 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q16 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q17 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q18 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q19 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q20 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q21 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q22 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q23 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q24 | 8-729-116-45 | s | PHOTOTRANSISTOR PH110 |
| Q25 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q26 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q27 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q28 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| QA1 | 3-670-095-00 | o | HOLDER, LED |
| QA2 | 3-670-095-00 | o | HOLDER, LED |
| QA3 | 3-670-095-00 | o | HOLDER, LED |
| QA7 | 3-670-095-00 | o | HOLDER, LED |
| QA8 | 3-670-095-00 | o | HOLDER, LED |
| QA9 | 3-670-095-00 | o | HOLDER, LED |
| QA14 | 3-670-095-00 | o | HOLDER, LED |
| QA15 | 3-670-095-00 | o | HOLDER, LED |
| QA16 | 3-670-095-00 | o | HOLDER, LED |
| QA22 | 3-670-095-00 | o | HOLDER, LED |
| QA23 | 3-670-095-00 | o | HOLDER, LED |
| QA24 | 3-670-095-00 | o | HOLDER, LED |
| S1 | 1-554-027-00 | s | SWITCH, DIGITAL |

## SE-201 BOARD(BKFC-8D)

One SE-201 board is used in BKFC-8D.

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | A-8271-777-A | o | MOUNTED CIRCUIT BOARD, SE-201 |
| 2pcs | 7-682-902-51 | s | SCREW +PWH 2.6X12 |
| 2pcs | 7-622-207-05 | s | N 2.6, TYPE 2 |
| C1 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C2 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C3 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C4 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C5 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C6 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C7 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C8 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C9 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C10 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C11 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C12 | 1-130-499-00 | s | MYLAR 0.22uF 5% 50V |
| C13 | 1-161-379-00 | s | CERAMIC 0.01uF 20% 25V |
| C14 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C15 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C16 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C17 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C18 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C19 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C20 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C21 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C22 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C23 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C24 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C25 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C26 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C27 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C28 | 1-126-925-11 | s | ELECT 470uF 20% 10V |
| C29 | 1-126-933-11 | s | ELECT 100uF 20% 16V |
| C30 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C31 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C32 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C33 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C34 | 1-161-494-00 | s | CERAMIC 0.022uF 25V |
| C35 | 1-126-923-11 | s | ELECT 220uF 20% 10V |
| # C36 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |
| CN1 | 1-506-693-11 | o | HEADER 20P, MALE |
| D1 | 8-719-157-80 | s | DIODE SE1003-C |
| D2 | 8-719-157-80 | s | DIODE SE1003-C |
| D3 | 8-719-157-80 | s | DIODE SE1003-C |
| D4 | 8-719-157-80 | s | DIODE SE1003-C |
| D5 | 8-719-911-19 | s | DIODE 1SS119 |
| D6 | 8-719-911-19 | s | DIODE 1SS119 |
| D7 | 8-719-911-19 | s | DIODE 1SS119 |
| D8 | 8-719-911-19 | s | DIODE 1SS119 |
| D9 | 8-719-157-80 | s | DIODE SE1003-C |
| D10 | 8-719-157-80 | s | DIODE SE1003-C |
| D11 | 8-719-157-80 | s | DIODE SE1003-C |
| D12 | 8-719-157-80 | s | DIODE SE1003-C |
| D13 | 8-719-911-19 | s | DIODE 1SS119 |
| D14 | 8-719-911-19 | s | DIODE 1SS119 |
| D15 | 8-719-911-19 | s | DIODE 1SS119 |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

(SE-201 BOARD(BKFC-8D))

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| D16 | 8-719-911-19 | s | DIODE 1SS119 |
| D17 | 8-719-921-01 | s | LED EBR5534S, RED |
| D18 | 8-719-921-01 | s | LED EBR5534S, RED |
| D19 | 8-719-921-01 | s | LED EBR5534S, RED |
| D20 | 8-719-157-80 | s | DIODE SE1003-C |
| D21 | 8-719-157-80 | s | DIODE SE1003-C |
| D22 | 8-719-157-80 | s | DIODE SE1003-C |
| D23 | 8-719-157-80 | s | DIODE SE1003-C |
| D24 | 8-719-911-19 | s | DIODE 1SS119 |
| D25 | 8-719-911-19 | s | DIODE 1SS119 |
| D26 | 8-719-911-19 | s | DIODE 1SS119 |
| D27 | 8-719-911-19 | s | DIODE 1SS119 |
| D28 | 8-719-921-01 | s | LED EBR5534S, RED |
| DA1 | 3-670-095-00 | o | HOLDER, LED |
| DA2 | 3-670-095-00 | o | HOLDER, LED |
| DA3 | 3-670-095-00 | o | HOLDER, LED |
| DA4 | 3-670-095-00 | o | HOLDER, LED |
| DA9 | 3-670-095-00 | o | HOLDER, LED |
| DA10 | 3-670-095-00 | o | HOLDER, LED |
| DA11 | 3-670-095-00 | o | HOLDER, LED |
| DA12 | 3-670-095-00 | o | HOLDER, LED |
| DA17 | 3-730-315-01 | o | HOLDER, LED |
| DA18 | 3-730-315-01 | o | HOLDER, LED |
| DA19 | 3-730-315-01 | o | HOLDER, LED |
| DA20 | 3-670-095-00 | o | HOLDER, LED |
| DA21 | 3-670-095-00 | o | HOLDER, LED |
| DA22 | 3-670-095-00 | o | HOLDER, LED |
| DA23 | 3-670-095-00 | o | HOLDER, LED |
| DA28 | 3-730-315-01 | o | HOLDER, LED |
| IC1 | 8-759-917-43 | s | IC SN74HC138N |
| IC2 | 8-759-991-02 | s | IC NE555P |
| IC3 | 8-759-232-68 | s | IC TC74HC160AP |
| IC4 | 8-759-901-25 | s | IC SN74LS125AN |
| Q1 | 8-729-900-61 | s | TRANSISTOR DTA114ES |
| Q2 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q3 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q4 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q5 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q6 | 8-729-900-61 | s | TRANSISTOR DTA114ES |
| Q7 | 8-729-900-61 | s | TRANSISTOR DTA114ES |
| Q8 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q9 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q10 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q11 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q12 | 8-729-900-61 | s | TRANSISTOR DTA114ES |
| Q13 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q14 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q15 | 8-729-900-61 | s | TRANSISTOR DTA114ES |
| Q16 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q17 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q18 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q19 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q20 | 8-729-927-03 | s | TRANSISTOR 2SC4115SS |
| Q21 | 8-729-900-74 | s | TRANSISTOR DTC143TS |
| Q22 | 8-729-900-61 | s | TRANSISTOR DTA114ES |

J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher

SE-222 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | 1-648-996-11 | o | PRINTED CIRCUIT BOARD, SE-222 |
| IC1 | 8-719-941-80 | s | PHOTO INTERRUPTER GP1S53 |

J ; S/N 30016 and higher
UC ; S/N 10139 and higher
EK ; S/N 20048 and higher

SE-223 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | 1-649-273-11 | o | PRINTED CIRCUIT BOARD, SE-223 |
| CN1 | 1-564-013-11 | o | PIN CONNECTOR, 3P |
| IC1 | 8-719-991-24 | s | PHOTO TRANSISTOR GP1S23 |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

## VS-49 BOARD(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| # 1pc | A-8276-757-A | o | MOUNTED CIRCUIT BOARD, VS-49 (FOR UC) |
| 1pc | A-8276-758-A | o | MOUNTED CIRCUIT BOARD, VS-49 (FOR EK) |
| CB1 | ⚠ 1-532-534-31 | s | BREAKER, CIRCUIT 1.6A 250V (UC ONLY) |
| CB1 | ⚠ 1-532-534-61 | s | BREAKER, CIRCUIT 1.6A 250V (EK ONLY) |
| CB2 | ⚠ 1-532-547-31 | s | BREAKER, CIRCUIT 10A 250V (UC ONLY) |
| CB2 | ⚠ 1-533-346-11 | s | BREAKER, CIRCUIT (EK ONLY) |
| CB3 | ⚠ 1-532-545-31 | s | BREAKER, CIRCUIT 6.3A 250V (UC ONLY) |
| CB3 | ⚠ 1-532-545-61 | s | BREAKER, CIRCUIT 6.3A 250V (EK ONLY) |
| CB4 | ⚠ 1-532-535-31 | s | BREAKER, CIRCUIT 1A 250V (UC ONLY) |
| CB4 | ⚠ 1-532-535-61 | s | BREAKER, CIRCUIT 1.0A 250V (EK ONLY) |
| CB5 | ⚠ 1-532-535-31 | s | BREAKER, CIRCUIT 1A 250V (UC ONLY) |
| CB5 | ⚠ 1-532-535-61 | s | BREAKER, CIRCUIT 1.0A 250V (EK ONLY) |
| CN1 | ⚠ 1-560-723-00 | s | CONNECTOR 3P, MALE |
| CN2 | ⚠ 1-564-943-21 | s | CONNECTOR 12P, MALE (UC ONLY) |
| CN3 | ⚠ 1-564-943-21 | s | CONNECTOR 12P, MALE (UC ONLY) |
| CN4 | ⚠ 1-564-943-21 | s | CONNECTOR 12P, MALE (EK ONLY) |
| CN5 | ⚠ 1-564-943-21 | s | CONNECTOR 12P, MALE (EK ONLY) |
| CN6 | ⚠ 1-564-943-21 | s | CONNECTOR 12P, MALE (EK ONLY) |
| CN7 | ⚠ 1-564-943-11 | s | CONNECTOR, 12P, MALE (UC ONLY) |
| CN8 | ⚠ 1-564-943-11 | s | CONNECTOR, 12P, MALE (UC ONLY) |
| CN9 | ⚠ 1-564-943-11 | s | CONNECTOR, 12P, MALE (EK ONLY) |
| CN10 | ⚠ 1-564-943-11 | s | CONNECTOR, 12P, MALE (EK ONLY) |
| CN11 | ⚠ 1-564-943-11 | s | CONNECTOR, 12P, MALE (EK ONLY) |
| CN12 | ⚠ 1-564-943-11 | s | CONNECTOR, 12P, MALE |
| CN13 | 1-560-178-00 | s | CONNECTOR 6P, MALE |
| CN14 | ⚠ 1-564-943-21 | s | CONNECTOR 12P, MALE |
| CN15 | 1-560-752-00 | s | CONNECTOR 9P, MALE |
| CN16 | 1-560-178-00 | s | CONNECTOR 6P, MALE |

## FRAME(BFC-1)

| Ref. No. or Q'ty | Part No. | SP | Description |
|---|---|---|---|
| 1pc | 1-515-556-31 | s | RELAY, THERMAL 45DEG-C |
| # 1pc | ⚠ 1-580-375-11 | s | INLET WITH FILTER, AC 3P, MALE |
| 4pcs | ⚠ 1-535-538-11 | s | TERMINAL, WIRE-END<br>(to COVERS OF CIRCUIT BREAKER AND AC INLET) |
| 1pc(to L1) | | | |
| | 1-561-083-00 | o | HOUSING, 2P |
| | ⚠ 1-535-427-00 | o | TERMINAL, WIRE-END |
| 1pc(to THERMAL RELAY) | | | |
| | 1-535-321-11 | o | TERMINAL, SOLDERLESS |
| 1pc | 1-696-899-11 | s | CABLE, FLAT (DP-1)<br>(Includes the following connectors.)<br>CN1(to DP-178 BOARD)<br>CN14(to MB-431 BOARD) |
| 1pc | 1-696-900-11 | s | CABLE, FLAT (HAM-1)<br>(Includes the following connectors.)<br>CN1(to SE-192 BOARD)<br>CN2(to SE-193 BOARD) |
| 1pc | 1-696-901-12 | s | CABLE, FLAT (ELV-1)<br>(Includes the following connectors.)<br>1pc(to MB-431 BOARD)<br>1pc(to CB-47 BOARD) |
| 1pc | 1-696-902-11 | s | CABLE, FLAT (ELV-0)<br>(Includes the following connectors.)<br>CN1(to CB-47 BOARD)<br>CN19(to MB-431 BOARD) |
| # 1pc | 1-696-903-13 | s | CABLE, FLAT (ELV-3)<br>(Includes the following connectors.)<br>CN1(to CB-49 BOARD)<br>CN2(to CB-48 BOARD) |
| # 1pc | 1-696-904-21 | s | CABLE, FLAT (ELV-2)<br>(Includes the following connectors.)<br>CN1(to CB-48 BOARD)<br>CN2(to CB-47 BOARD) |
| # 1pc | 1-951-169-21 | s | HARNESS (PG-1)<br>(Includes the following parts.)<br>CN4(to SE-192 BOARD)<br>1-560-372-00 o TERMINAL, SOLDERLESS<br>1-561-515-00 o CONNECTOR HOUSING (3P)<br>PL1<br>1-454-477-11 s PLUNGER(DOOR OPEN) |
| # 1pc | 1-952-389-11 | o | HARNESS (DS-2)<br>(Includes the following parts.)<br>CN6(to CB-61 BOARD)<br>1-560-372-00 o TERMINAL, SOLDERLESS<br>1-561-516-00 o CONNECTOR HOUSING, ILG (4P) FEMALE<br>S2<br>1-692-708-11 s SWITCH, MICRO(DOOR OPEN) |
| 1pc | 1-951-172-11 | s | HARNESS (BIN-1)<br>(Includes the following parts.)<br>CN1(to SE-199/201 BOARD)<br>1-565-252-11 s SOCKET, FLAT CABLE 20P<br>CN2(to SE-198/200 BOARD)<br>1-565-252-11 s SOCKET, FLAT CABLE 20P |

NOTE 1 : Please see page 16-18 for parts that are not listed in the parts list.

NOTE 2 : For the # marked in the following parts list, refer to section 17, Changed Parts.

# SECTION 17
# CHANGED PARTS

NOTE: The numbers identified by making with ) are matching with each serial numbers.
See the table mached with each serial numbers as follows;

210) Serial No. 30003 and higher (for J)
Serial No. 10016 and higher (for UC)
Serial No. 20007 and higher (for EK)

211) Serial No. 30003 and higher (for J)
Serial No. 10026 and higher (for UC)
Serial No. 20013 and higher (for EK)

302) Serial No. 30012 and higher (for J)
Serial No. 10089 and higher (for UC)
Serial No. 20038 and higher (for EK)

303) Serial No. 30016 and higher (for J)
Serial No. 10119 and higher (for UC)
Serial No. 20038 and higher (for EK)

308) Serial No. 30016 and higher (for J)
Serial No. 10139 and higher (for UC)
Serial No. 20048 and higher (for EK)

310) Serial No. 30021 and higher (for J)
Serial No. 10145 and higher (for UC)
Serial No. 20062 and higher (for EK)

401) Serial No. 30031 and higher (for J)
Serial No. 10160 and higher (for UC)
Serial No. 20082 and higher (for EK)

402) Serial No. 30036 and higher (for J)
Serial No. 10170 and higher (for UC)
Serial No. 20092 and higher (for EK)

403) Serial No. 30036 and higher (for J)
Serial No. 10170 and higher (for UC)
Serial No. 20107 and higher (for EK)

CB-50 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | 1-646-804-11 | o | PRINTED CIRCUIT BOARD, CB-50 |
| 402) | 1pc | DELETED | | |

CK-39 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | A-8271-770-A | o | MOUNTED CIRCUIT BOARD, CK-39 |
| 303) | 1pc | A-8271-770-B | o | MOUNTED CIRCUIT BOARD, CK-39 |
| 402) | 1pc | A-8271-770-C | o | MOUNTED CIRCUIT BOARD, CK-39 |
| OLD) | 1pc | 3-178-857-01 | o | PANEL (CK-39), CONNECTOR |
| 303) | 1pc | 3-178-857-03 | o | PANEL (CK-39), CONNECTOR |
| 402) | 1pc | 3-178-857-04 | o | PANEL (CK-39), CONNECTOR |
| OLD) | 2pcs | NOT IN USE. | | |
| 303) | 2pcs | 7-685-648-79 | s | SCREW + BVTP 3X12 |
| OLD) | 2pcs | 7-688-004-11 | s | W 4, MIDDLE |
| 303) | 2pcs | DELETED. | | |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| OLD) | 2pcs | 3-680-316-00 | s | NUT (M4), STOPPER |
| 402) | 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| OLD) | 2pcs | 7-682-565-04 | s | SCREW +B 4X16 |
| 402) | 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| OLD) | 2pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| 402) | 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| OLD) | 3pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| 303) | 2pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| OLD) | BNC1 | 1-563-354-11 | s | CONNECTOR, BNC, FEMALE |
| 303) | BNC1 | 1-691-431-11 | s | CONNECTOR, BNC, FEMALE |
| OLD) | BNC2 | 1-563-354-11 | s | CONNECTOR, BNC, FEMALE |
| 303) | BNC2 | 1-691-431-11 | s | CONNECTOR, BNC, FEMALE |
| OLD) | BNC3 | 1-563-354-11 | s | CONNECTOR, BNC, FEMALE |
| 303) | BNC3 | DELETED. | | |

CPU-107 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | A-8271-765-A | o | MOUNTED CIRCUIT BOARD, CPU-107 |
| 402) | 1pc | A-8271-765-B | o | MOUNTED CIRCUIT BOARD, CPU-107 |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 3-172-089-01 | o | HANDLE |
| OLD) | 1pc | 3-178-858-01 | o | PANEL (CPU-107), CONNECTOR |
| 402) | 1pc | 3-178-858-03 | o | PANEL (CPU-107), CONNECTOR |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| OLD) | 2pcs | 3-680-316-00 | s | NUT (M4), STOPPER |
| 402) | 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| OLD) | 2pcs | 7-682-565-04 | s | SCREW +B 4X16 |
| 402) | 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| OLD) | 2pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| 402) | 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| OLD) | IC8 | 1-540-077-11 | o | SOCKET, IC(PGA) 68P |
| 303) | IC8 | DELETED. | | |
| OLD) | IC14 | 8-759-173-69 | o | IC 27C2048-CPU107V101, EPROM |
| 308) | IC14 | 8-759-256-71 | o | IC 27C240-CPU107V111 |
| 310) | IC14 | 8-759-720-95 | o | IC 27C240-CPU107V120 |

## CPU-118 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | A-8271-768-A | o | MOUNTED CIRCUIT BOARD, CPU-118 |
| 402) | 1pc | A-8271-768-B | o | MOUNTED CIRCUIT BOARD, CPU-118 |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 3-172-089-01 | o | HANDLE |
| OLD) | 1pc | 3-178-856-01 | o | PANEL (CPU-118), CONNECTOR |
| 402) | 1pc | 3-178-856-02 | o | PANEL (CPU-118), CONNECTOR |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| OLD) | 2pcs | 3-680-316-00 | s | NUT (M4), STOPPER |
| 402) | 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| OLD) | 2pcs | 7-682-565-04 | s | SCREW +B 4X16 |
| 402) | 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| OLD) | 2pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| 402) | 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| OLD) | C1 | 1-162-289-31 | s | CERAMIC 390pF 10% 50V |
| 303) | C1 | DELETED. | | |
| OLD) | C52 | NOT IN USE. | | |
| 303) | C52 | 1-162-289-31 | s | CERAMIC 390pF 10% 50V |
| 308) | C52 | 1-162-286-31 | s | CERAMIC 220pF 10% 50V |
| OLD) | IC8 | 1-540-077-11 | o | SOCKET, IC (PGA) 68P |
| 303) | IC8 | DELETED | | |
| OLD) | IC10 | 8-759-173-70 | o | IC 27C2048-CPU118V101, EPROM |
| 308) | IC10 | 8-759-256-70 | o | IC 27C240-CPU118V111 |
| 310) | IC10 | 8-759-270-96 | o | IC 27C240-CPU118V120 |
| OLD) | R62 | NOT IN USE. | | |
| 303) | R62 | 1-249-405-11 | s | CARBON 100 5% 1/4W |
| 308) | R62 | 1-249-404-00 | s | CARBON 82 5% 1/4W |

## DP-178 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | C44 | NOT IN USE. | | |
| 302) | C44 | 1-163-037-11 | s | CERAMIC, CHIP 0.022uF 10% 25V |
| OLD) | JW3 | JUMPER LEAD. | | |
| 302) | JW3 | 1-217-666-31 | s | RES, SHORT 0.01 1/6W |
| OLD) | Q2 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q2 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q3 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q3 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q5 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q5 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q6 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q6 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q9 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q9 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q10 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q10 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q12 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q12 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q13 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q13 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q16 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q16 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q17 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q17 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q20 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q20 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q21 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q21 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q24 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q24 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q25 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q25 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q66 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q66 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q67 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q67 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q68 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q68 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q69 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q69 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q70 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q70 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q71 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q71 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q72 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q72 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q73 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q73 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q74 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q74 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q75 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q75 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q76 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q76 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q77 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q77 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q78 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q78 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |
| OLD) | Q79 | 8-729-920-31 | s | TRANSISTOR DTC343TK |
| 302) | Q79 | 8-729-901-88 | s | TRANSISTOR 2SC2411K-CR |

(DP-178 BOARD)

| | | | | |
|---|---|---|---|---|
| OLD) | R152 | 1-216-295-00 | s | METAL, CHIP 0 |
| 302) | R152 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R153 | 1-216-295-00 | s | METAL, CHIP 0 |
| 302) | R153 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R154 | 1-216-295-00 | s | METAL, CHIP 0 |
| 302) | R154 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R155 | 1-216-295-00 | s | METAL, CHIP 0 |
| 302) | R155 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R156 | 1-216-295-00 | s | METAL, CHIP 0 |
| 302) | R156 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R157 | 1-216-295-00 | s | METAL, CHIP 0 |
| 302) | R157 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R158 | 1-216-295-00 | s | METAL, CHIP 0 |
| 302) | R158 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R159 | NOT IN USE. | | |
| 302) | R159 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R160 | NOT IN USE. | | |
| 302) | R160 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R161 | NOT IN USE. | | |
| 302) | R161 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R162 | NOT IN USE. | | |
| 302) | R162 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R163 | NOT IN USE. | | |
| 302) | R163 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R164 | NOT IN USE. | | |
| 302) | R164 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R165 | NOT IN USE. | | |
| 302) | R165 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R166 | NOT IN USE. | | |
| 302) | R166 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R167 | NOT IN USE. | | |
| 302) | R167 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R168 | NOT IN USE. | | |
| 302) | R168 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R169 | NOT IN USE. | | |
| 302) | R169 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R170 | NOT IN USE. | | |
| 302) | R170 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R171 | NOT IN USE. | | |
| 302) | R171 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R172 | NOT IN USE. | | |
| 302) | R172 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R173 | NOT IN USE. | | |
| 302) | R173 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R174 | NOT IN USE. | | |
| 302) | R174 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R175 | NOT IN USE. | | |
| 302) | R175 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R176 | NOT IN USE. | | |
| 302) | R176 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R177 | NOT IN USE. | | |
| 302) | R177 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R178 | NOT IN USE. | | |
| 302) | R178 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | R179 | NOT IN USE. | | |
| 302) | R179 | 1-216-047-00 | s | METAL, CHIP 820 5% 1/10W |
| OLD) | S8 | 1-571-167-11 | s | SWITCH, TACTILE, WITH LED |
| 308) | S8 | 1-692-612-11 | s | SWITCH, TACTILE |
| OLD) | S9 | 1-554-088-00 | s | SWITCH, PUSH |
| 308) | S9 | DELETED | | |

DR-187 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 6pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| 402) | 3pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| OLD) | C21 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C21 | DELETED. | | |
| OLD) | C23 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C23 | DELETED. | | |
| OLD) | C25 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C25 | DELETED. | | |
| OLD) | C27 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C27 | DELETED. | | |
| OLD) | C29 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C29 | DELETED. | | |
| OLD) | C31 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C31 | DELETED. | | |
| OLD) | C33 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C33 | DELETED. | | |
| OLD) | C35 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C35 | DELETED. | | |
| OLD) | C39 | 1-130-476-00 | s | MYLAR 0.0027uF 5% 50V |
| 210) | C39 | 1-130-480-00 | s | MYLAR 0.0056uF 5% 50V |
| OLD) | C40 | 1-130-476-00 | s | MYLAR 0.0027uF 5% 50V |
| 210) | C40 | 1-130-480-00 | s | MYLAR 0.0056uF 5% 50V |
| OLD) | C41 | 1-130-476-00 | s | MYLAR 0.0027uF 5% 50V |
| 210) | C41 | 1-130-480-00 | s | MYLAR 0.0056uF 5% 50V |
| OLD) | C44 | 1-130-476-00 | s | MYLAR 0.0027uF 5% 50V |
| 210) | C44 | 1-130-480-00 | s | MYLAR 0.0056uF 5% 50V |
| OLD) | C50 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C50 | DELETED. | | |
| OLD) | C52 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C52 | DELETED. | | |
| OLD) | C54 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C54 | DELETED. | | |
| OLD) | C56 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C56 | DELETED. | | |
| OLD) | C58 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C58 | DELETED. | | |
| OLD) | C60 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C60 | DELETED. | | |
| OLD) | C62 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C62 | DELETED. | | |
| OLD) | C64 | 1-162-282-31 | s | CERAMIC 100pF 10% 50V |
| 210) | C64 | DELETED. | | |
| OLD) | R21 | 1-249-427-11 | s | CARBON 6.8k 5% 1/4W |
| 210) | R21 | 1-249-421-11 | s | CARBON 2.2k 5% 1/4W |
| OLD) | R22 | 1-249-417-11 | s | CARBON 1k 5% 1/4W |
| 210) | R22 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| OLD) | R23 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R23 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R37 | 1-249-417-11 | s | CARBON 1k 5% 1/4W |
| 210) | R37 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| OLD) | R38 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R38 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R44 | 1-249-417-11 | s | CARBON 1k 5% 1/4W |
| 210) | R44 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| OLD) | R45 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R45 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R46 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R46 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R62 | 1-249-417-11 | s | CARBON 1k 5% 1/4W |
| 210) | R62 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |

(DR-187 BOARD)

| | | | | |
|---|---|---|---|---|
| OLD) | R63 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R63 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R166 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R166 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R167 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R167 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R169 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R169 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R171 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R171 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R172 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R172 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R176 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R176 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R178 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R178 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R179 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R179 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R186 | 1-215-421-00 | s | METAL 1k 1% 1/6W |
| 210) | R186 | 1-215-426-00 | s | METAL 1.6k 1% 1/6W |
| OLD) | R192 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R192 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R193 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R193 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |
| OLD) | R194 | 1-249-429-11 | s | CARBON 10k 5% 1/4W |
| 210) | R194 | 1-249-438-11 | s | CARBON 56k 5% 1/4W |

## IF-373 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | 3-178-855-01 | o | PANEL (IF-373), CONNECTOR |
| 402) | 1pc | 3-178-855-03 | o | PANEL (IF-373), CONNECTOR |
| OLD) | 2pcs | 3-680-316-00 | s | NUT (M4), STOPPER |
| 402) | 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| OLD) | 2pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| 402) | 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| OLD) | 2pcs | 7-682-565-04 | s | SCREW +B 4X16 |
| 402) | 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| OLD) | IC11 | 8-759-173-09 | o | IC 27C256-IF373V100, EPROM |
| 301) | IC11 | 8-759-182-46 | o | IC 27C256-IF373V100 |
| 308) | IC11 | 8-759-254-16 | o | IC 27C256-IF373V110 |
| 310) | IC11 | 8-759-720-94 | o | IC 27C256-IF373V120 |

## IF-401 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | A-8271-769-A | o | MOUNTED CIRCUIT BOARD, IF-401 |
| 402) | 1pc | A-8271-769-B | o | MOUNTED CIRCUIT BOARD, IF-401 |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 3-172-089-01 | o | HANDLE |
| OLD) | 1pc | 3-178-847-01 | o | PANEL (IF-401), CONNECTOR |
| 402) | 1pc | 3-178-847-02 | o | PANEL (IF-401), CONNECTOR |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 3-714-855-11 | o | SPACER, REAR PANEL |
| OLD) | 2pcs | 3-680-316-00 | s | NUT (M4), STOPPER |
| 402) | 2pcs | 3-696-510-01 | s | WASHER (3), STOPPER |
| OLD) | NOT IN USE. | | | |
| 402) | 2pcs | 7-682-547-04 | s | SCREW +B 3X6 |
| OLD) | 2pcs | 7-682-565-04 | s | SCREW +B 4X16 |
| 402) | 2pcs | 7-682-566-04 | s | SCREW +B 4X20 |
| OLD) | 2pcs | 7-682-947-01 | s | SCREW +PSW 3X6 |
| 402) | 2pcs | 7-682-949-01 | s | SCREW +PSW 3X10 |
| OLD) | C80 | NOT IN USE. | | |
| 303) | C80 | 1-130-495-00 | s | ELECT 0.1uF |
| OLD) | DB1 | 8-759-518-61 | s | IC SN74S1057SC |
| 303) | DB1 | DELETED. | | |
| OLD) | DB2 | 8-759-518-61 | s | IC SN74S1057SC |
| 303) | DB2 | DELETED. | | |
| OLD) | DB3 | 8-759-518-61 | s | IC SN74S1057SC |
| 303) | DB3 | DELETED. | | |
| OLD) | IC4 | 8-759-910-43 | s | IC CX23028 |
| 401) | IC4 | 8-759-273-24 | s | IC CX23028A |
| OLD) | IC5 | 8-759-910-43 | s | IC CX23028 |
| 401) | IC5 | 8-759-273-24 | s | IC CX23028A |
| OLD) | IC46 | NOT IN USE. | | |
| 303) | IC46 | 8-759-239-47 | s | IC TC74HC123AP |
| OLD) | R73 | NOT IN USE. | | |
| 303) | R73 | 1-247-887-00 | s | CARBON 220k 5% 1/4W |
| OLD) | RB3 | NOT IN USE. | | |
| 303) | RB3 | 1-235-710-11 | s | RESISTOR BLOCK 680X8 |
| OLD) | RB4 | NOT IN USE. | | |
| 303) | RB4 | 1-235-705-11 | s | RESISTOR BLOCK 270X8 |
| OLD) | RB5 | NOT IN USE. | | |
| 303) | RB5 | 1-235-710-11 | s | RESISTOR BLOCK 680X8 |
| OLD) | RB6 | NOT IN USE. | | |
| 303) | RB6 | 1-235-705-11 | s | RESISTOR BLOCK 270X8 |
| OLD) | RB7 | NOT IN USE. | | |
| 303) | RB7 | 1-235-713-11 | s | RESISTOR BLOCK 1.2kX8 |
| OLD) | RB8 | NOT IN USE. | | |
| 303) | RB8 | 1-231-401-00 | s | RESISTOR BLOCK 470X8 |

## MB-431 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 2pcs | NOT IN USE. | | |
| 303) | 2pcs | 7-682-902-51 | s | SCREW +PWH 2.6X12 |
| OLD) | 26pcs | 7-622-207-05 | s | N 2.6, TYPE 2 |
| 303) | 28pcs | 7-622-207-05 | s | N 2.6, TYPE 2 |
| | | | | |
| OLD) | R5 | NOT IN USE. | | |
| 303) | R5 | 1-249-429-11 | s | CARBON (SMALL) 10k 5% 1/4W |
| 308) | R5 | 1-247-855-31 | s | CARBON (SMALL) 10k 5% 1/4W |

## PS-330 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | A-8271-862-A | o | MOUNTED CIRCUIT BOARD, PS-330 |
| 308) | 1pc | A-8271-862-B | o | MOUNTED CIRCUIT BOARD, PS-330 |
| OLD) | 4pcs | 4-026-252-00 | s | WASHER, INSULATING |
| 302) | 4pcs | DELETED. | | |
| OLD) | 4pcs | 4-857-833-00 | s | INSULATOR, 03P |
| 308) | 2pcs | 4-857-833-00 | s | INSULATOR, 03P |
| | | | | |
| OLD) | 4pcs | 7-682-548-04 | s | SCREW +B3X8 |
| 302) | 4pcs | DELETED. | | |
| OLD) | 4pcs | NOT IN USE. | | |
| 302) | 4pcs | 7-682-950-01 | s | SCREW +PSW 3X12 |
| OLD) | NOT IN USE | | | |
| 308) | 6pcs | 7-683-405-04 | s | BOLT, HEXAGON SOCKET 3X10 |
| | | | | |
| OLD) | NOT IN USE | | | |
| 308) | 6pcs | 7-688-003-11 | s | WASHER 3, MIDDLE |
| | | | | |
| OLD) | C11 | 1-126-157-11 | s | ELECT 10uF 20% 16V |
| 302) | C11 | 1-124-915-11 | s | ELECT 10uF 20% 63V |
| OLD) | C16 | 1-126-943-11 | s | ELECT 2200uF 20% 25V |
| 302) | C16 | 1-126-936-11 | s | ELECT 3300uF 20% 16V |
| OLD) | C23 | NOT IN USE. | | |
| 302) | C23 | 1-126-941-11 | s | ELECT 470uF 20% 25V |
| | | | | |
| OLD) | C28 | 1-126-096-11 | s | ELECT 10uF 20% 35V |
| 302) | C28 | 1-124-915-11 | s | ELECT 10uF 20% 63V |
| OLD) | C29 | 1-126-096-11 | s | ELECT 10uF 20% 35V |
| 302) | C29 | 1-124-915-11 | s | ELECT 10uF 20% 63V |
| | | | | |
| OLD) | D12 | NOT IN USE. | | |
| 302) | D12 | 8-719-921-63 | s | DIODE MTZJ-7.5B |
| OLD) | D24 | 8-719-921-63 | s | DIODE MTZJ-7.5B |
| 302) | D24 | DELETED. | | |

## SE-193 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | IC6 | 8-759-916-64 | s | IC SN74HC238AN |
| 308) | IC6 | 8-759-232-85 | s | IC TC74HC238AP |
| OLD) | IC7 | 8-759-916-64 | s | IC SN74HC238AN |
| 308) | IC7 | 8-759-232-85 | s | IC TC74HC238AP |

## SE-198 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | R25 | 1-249-420-11 | s | CARBON 1.8k 5% 1/4W |
| 210) | R25 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| OLD) | R26 | 1-249-420-11 | s | CARBON 1.8k 5% 1/4W |
| 210) | R26 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| OLD) | R27 | 1-249-420-11 | s | CARBON 1.8k 5% 1/4W |
| 210) | R27 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| | | | | |
| OLD) | R32 | 1-249-422-11 | s | CARBON 2.7k 5% 1/4W |
| 210) | R32 | 1-249-413-11 | s | CARBON 470 5% 1/4W |
| OLD) | R33 | 1-249-422-11 | s | CARBON 2.7k 5% 1/4W |
| 210) | R33 | 1-249-413-11 | s | CARBON 470 5% 1/4W |
| OLD) | R34 | 1-249-422-11 | s | CABON 2.7k 5% 1/4W |
| 210) | R34 | 1-249-413-11 | s | CARBON 470 5% 1/4W |
| | | | | |
| OLD) | R38 | 1-249-420-11 | s | CARBON 1.8k 5% 1/4W |
| 210) | R38 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| OLD) | R39 | 1-249-422-11 | s | CARBON 2.7k 5% 1/4W |
| 210) | R39 | 1-249-413-11 | s | CARBON 470 5% 1/4W |
| OLD) | R40 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R40 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| | | | | |
| OLD) | R41 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R41 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R42 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R42 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R45 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R45 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| | | | | |
| OLD) | R46 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R46 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R52 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R52 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R53 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R53 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| | | | | |
| OLD) | R54 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R54 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R60 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R60 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R61 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R61 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |

## SE-199 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | C32 | NOT IN USE. | | |
| 210) | C32 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |

## SE-200 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | R28 | 1-249-420-11 | s | CARBON 1.8k 5% 1/4W |
| 210) | R28 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| OLD) | R29 | 1-249-420-11 | s | CARBON 1.8k 5% 1/4W |
| 210) | R29 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| OLD) | R30 | 1-249-420-11 | s | CARBON 1.8k 5% 1/4W |
| 210) | R30 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| OLD) | R31 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 210) | R31 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R32 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 210) | R32 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R33 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 210) | R33 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R40 | 1-249-422-11 | s | CARBON 2.7k 5% 1/4W |
| 210) | R40 | 1-249-413-11 | s | CARBON 470 5% 1/4W |
| OLD) | R41 | 1-249-422-11 | s | CARBON 2.7k 5% 1/4W |
| 210) | R41 | 1-249-413-11 | s | CARBON 470 5% 1/4W |
| OLD) | R42 | 1-249-422-11 | s | CARBON 2.7k 5% 1/4W |
| 210) | R42 | 1-249-413-11 | s | CARBON 470 5% 1/4W |
| OLD) | R43 | 1-249-420-11 | s | CARBON 1.8k 5% 1/4W |
| 210) | R43 | 1-249-411-11 | s | CARBON 330 5% 1/4W |
| OLD) | R47 | 1-249-422-11 | s | CARBON 2.7k 5% 1/4W |
| 210) | R47 | 1-249-413-11 | s | CARBON 470 5% 1/4W |
| OLD) | R48 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R48 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R49 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R49 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R50 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R50 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R56 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R56 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R57 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R57 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R58 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R58 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R64 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R64 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R65 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R65 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |
| OLD) | R66 | 1-249-433-11 | s | CARBON 22k 5% 1/4W |
| 211) | R66 | 1-249-437-11 | s | CARBON 47k 5% 1/4W |

## SE-201 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | C36 | NOT IN USE. | | |
| 210) | C36 | 1-162-294-31 | s | CERAMIC 0.001uF 10% 50V |

## VS-49 BOARD

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | A-8276-543-A | o | MOUNTED CIRCUIT BOARD, VS-49 |
| 308) | 1pc | A-8276-757-A | o | MOUNTED CIRCUIT BOARD, VS-49 (FOR UC) |
| | | A-8276-758-A | o | MOUNTED CIRCUIT BOARD, VS-49 (FOR EK) |

## FRAME

| | | | | |
|---|---|---|---|---|
| OLD) | 1pc | 1-696-903-11 | s | CABLE, FLAT (EV-3) |
| 302) | 1pc | 1-696-903-13 | s | CABLE, FLAT (EV-3) |
| OLD) | 1pc | 1-696-904-11 | s | CABLE, FLAT (EV-2) |
| 302) | 1pc | 1-696-904-13 | s | CABLE, FLAT (EV-2) |
| 403) | 1pc | 1-696-904-21 | s | CABLE, FLAT (EV-2) |
| OLD) | 1pc ⚠ | 1-526-813-12 | s | INLET WITH FILTER, AC 3P, MALE |
| 308) | 1pc ⚠ | 1-580-375-11 | s | INLET WITH FILTER, AC 3P, MALE |
| OLD) | 1pc ⚠ | 1-557-377-11 | s | CORD, POWER (FOR UC) |
| 308) | 1pc ⚠ | 1-551-812-11 | s | CORD, POWER (FOR UC) |
| OLD) | 1pc | 1-951-169-11 | s | HARNESS (PG-1) |
| | | (Includes the following parts.) | | |
| | | CN4 (to SE-192 BOARD) | | |
| | | 1-560-372-00 | o | TERMINAL, SOLDERLESS |
| | | 1-561-515-00 | o | CONNECTOR HOUSING (3P) |
| | | PL1 | | |
| | | 1-454-477-11 | s | PLUNGER (DOOR OPEN) |
| 308) | 1pc | 1-951-169-21 | s | HARNESS (PG-1) |
| | | (Includes the following parts.) | | |
| | | CN4 (to CB-61 BOARD) | | |
| | | 1-564-372-00 | o | TERMINAL, SOLDERLESS |
| | | 1-561-515-00 | o | CONNECTOR HOUSING (3P) |
| | | PL1 | | |
| | | 1-454-477-11 | s | PLUNGER (DOOR OPEN) |
| OLD) | 1pc | 1-951-170-12 | s | HARNESS (DS-1) |
| | | (Includes the following parts.) | | |
| | | CN5 (to SE-192 BOARD) | | |
| | | 1-560-372-00 | o | TERMINAL, SOLDERLESS |
| | | 1-561-515-00 | o | CONNECTOR HOUSING ILG (3P) |
| | | S2 | | |
| | | 1-553-661-00 | s | SWITCH, MICRO (DOOR OPEN) |
| 308) | 1pc | 1-952-389-11 | o | HARNESS (DS-2) |
| | | (Includes the following parts.) | | |
| | | CN6 (to CB-61 BOARD) | | |
| | | 1-560-372-00 | o | TERMINAL, SOLDERLESS |
| | | 1-561-516-00 | o | CONNECTOR HOUSING ILG (4P) FEMALE |
| | | S2 | | |
| | | 1-692-708-11 | s | SWITCH, MICRO (DOOR OPEN) |
| OLD) | 1pc | 1-951-282-12 | s | HARNESS (BIN-R) |
| 308) | 1pc | 1-951-282-13 | s | HARNESS (BIN-R) |
| OLD) | 1pc | 1-951-285-11 | o | HARNESS (VSM-2) |
| 308) | 1pc | 1-951-285-12 | o | HARNESS (VSM-2) |
| OLD) | CB1 ⚠ | 1-576-036-11 | s | BREAKER, CIRCUIT 6A 250V |
| 308) | CB1 ⚠ | 1-533-374-11 | s | BREAKER, CIRCUIT 7.5A 250V |
| OLD) | FL1 ⚠ | 1-464-415-21 | s | FILTER, LINE |
| 308) | FL1 ⚠ | 1-424-630-11 | s | FILTER, LINE |
| OLD) | S1 ⚠ | 1-570-117-31 | s | SWITCH, SEESAW (AC POWER) |
| 308) | S1 | DELETED. | | |